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WATER-SUPPLY PAPER 321

SURFACE WATER SUPPLY OF THE UNITED STATES

1912

PART I. NORTH ATLANTIC COAST BASINS

BY

C. C. BABB, C. C. COVERT, AND
J. G. MATHERS

WASHINGTON
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SURFACE WATER SUPPLY OF THE NORTH ATLANTIC COAST BASINS, 1912.

By C. C. Babb, C. C. Covert, and J. G. Mathers.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of twelve reports presenting results of measurements of flow made on streams in the United States during the calendar year 1912.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394) which contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated, either by (a) furnishing data or (b) by assisting in collecting the data. Acknowledgments for cooperation under class "a" are made in connection with the description of each station affected, and for class "b" on page 16.

Measurements of stream flow have been made at about 2,000 points in the United States, and also at many points in small areas in

Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1912, gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular water supply papers from time to time.

PUBLICATIONS.

For each calendar year there has been prepared a report embodying the stream-flow data collected during that year. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119. Circulars are also available giving complete lists of the gaging stations maintained by the Survey to date, and a list of the reports relating to the water supply of the country.

Prior to 1902, gage heights and discharge measurements were published in water-supply papers or bulletins and estimates of monthly discharge in annual reports; since 1902, both classes of data have been published in water-supply papers, and they are now being published in 12 parts, as shown in the following table:

Papers on surface water supply of the United States, 1912.

Part.[a]	No.	Title.
I	321	North Atlantic coast basins.
II	322	South Atlantic coast and eastern Gulf of Mexico basins.
III	323	Ohio River basin.
IV	324	St. Lawrence River basin.
V	325	Upper Mississippi River and Hudson Bay basins.
VI	326	Missouri River basin.
VII	327	Lower Mississippi River basin.
VIII	328	Western Gulf of Mexico basins.
IX	329	Colorado River basin.
X	330	Great Basin.
XI	331	Pacific coast basins in California.
XII	332	North Pacific coast basins.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

A list of reports containing stream-flow data is presented in the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only.	
11th A, pt 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	do	1903.
WS 124 to 135	do	1904.
WS 165 to 178	do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	Complete data	1907–8.
WS 261 to 272	do	1909.
WS 281 to 292	do	1910.
WS 301 to 312	do	1911.
WS 321 to 332	do	1912.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1912. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for any station in the area covered by Part I are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, and 321, which contain records for the New England streams from 1903 to 1912. The year covered by the report is indicated at the head of the column in which the paper is listed.

Numbers of water-supply papers containing results of stream measurements, 1899–1912.

	1899 [a]	1900 [b]	1901	1902	1903	1904
North Atlantic coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 82, 83	[g] 97, 98	[f] 126, 127
Ohio River basin	36	48, [h] 49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129
Hudson Bay and upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, 100	[j] 128, 130
Missouri River	[k] 36, 37	49, [l] 50	66, 75	84	99	130, [m] 131
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	[n] 37, 38	50	66, 75	85	100	133
Great Basin	38, [p] 39	51	66, 75	85	100	133, [q] 134
Pacific coast in California	38, [r] 39	51	66, 75	85	100	134
North Pacific coast	38	51	66, 75	85	100	135

	1905	1906	1907–8	1909	1910	1911	1912
North Atlantic coast (St. John River to York River)	[d] 165, [e] 166, [f] 167	[d] 201, [e] 202, [f] 203	241	261	281	301	321
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[f] 167, 168	[f] 203, 204	242	262	282	302	322
Ohio River basin	169	205	243	263	283	303	323
St. Lawrence River and Great Lakes	170	206	244	264	284	304	324
Hudson Bay and upper Mississippi River	171	207	245	265	285	305	325
Missouri River	172	208	246	266	286	306	326
Lower Mississippi River	[j] 169, 173	[j] 205, 209	247	267	287	307	327
Western Gulf of Mexico	174	210	248	268	288	308	328
Colorado River	175, [o] 177	211	249	269	289	309	329
Great Basin	176, [q] 177	212, [q] 213	250, [q] 251	270, [q] 271	290	310	330
Pacific coast in California	177	213	251	271	291	311	331
North Pacific coast	[s] 177, 178	214	252	272	292	312	332

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Ann. Rept., pt. 4.

[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Estimates for 1900 in 22d An. Rept., Pt. IV.

[c] Wissahickon and Schuylkill Rivers to James River.

[d] New England rivers only.

[e] Hudson River to Delaware River, inclusive.

[f] Susquehanna River to Yadkin River, inclusive.

[g] James River only.

[h] Scioto River.

[i] Lake Ontario and tributaries to St. Lawrence River proper.

[j] Tributaries of Mississippi from east.

[k] Gallatin River.

[l] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[m] Platte and Kansas rivers.

[n] Green and Gunnison rivers and Grand River above junction with Gunnison.

[o] Below junction with Gila.

[p] Mohave River only.

[q] Great Basin in California, excepting Truckee and Carson drainage basins.

[r] Kings and Kern rivers and south Pacific coast drainage basins.

[s] Rogue, Umpqua, and Siletz rivers only.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.
3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.
4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Newport, Ky., Federal Building.
St. Paul, Minn., Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 302 Chamber of Commerce Building.
Salt Lake City, Utah, Brooks Arcade.
Boise, Idaho, 615 Idaho Building.
Tacoma, Wash., Federal Building.
Portland, Oreg., 416 Couch Building.
San Francisco, Cal., 505 Customhouse.
Los Angeles, Cal., Federal Building.
Santa Fe, N. Mex., Capitol Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications will be sent on application to the Director of the United States Geological Survey, Washington, D. C.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches, and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off in depth in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot a second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge (second-feet per square mile).	Run-off (depth in inches).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.03719	1.041	1.079	1.116	1.153
2	.07438	2.083	2.157	2.231	2.306
3	.11157	3.124	3.236	3.347	3.459
4	.14876	4.165	4.314	4.463	4.612
5	.18595	5.207	5.393	5.578	5.764
6	.22314	6.248	6.471	6.694	6.917
7	.26033	7.289	7.550	7.810	8.070
8	.29752	8.331	8.628	8.926	9.223
9	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge in second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	1.983	55.54	57.52	59.50	61.49
2	3.967	111.1	115.0	119.0	123.0
3	5.950	166.6	172.6	178.5	184.5
4	7.934	222.1	230.1	238.0	246.0
5	9.917	277.7	287.6	297.5	307.4
6	11.90	333.2	345.1	357.0	368.9
7	13.88	388.8	402.6	416.5	430.4
8	15.87	444.3	460.2	476.0	491.9
9	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply the values for one day by the number of days.

1 second-foot equals 40 California miner's inches (Law of March 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

100 Colorado miner's inches for one day equals 5.17 acre-feet.

100 United States gallons per minute equals 0.223 second-foot.

100 United States gallons per minute for one day equals 0.442 acre-foot.

1,000,000 United States gallons per day equals 1.55 second-feet.

1,000,000 United States gallons equals 3.07 second-feet.

1,000,000 cubic feet equals 22.95 acre-feet.

1 acre-foot equals 325,850 gallons.

1 inch deep on 1 square mile equals 2,323,200 cubic feet.

1 inch deep on 1 square mile equals 0.0737 second-foot per year.

1 foot equals 0.3048 meter.

1 mile equals 1.60935 kilometers.

1 mile equals 5,280 feet.

1 acre equals 0.4047 hectare.

1 acre equals 43,560 square feet.

1 acre equals 209 feet square, nearly.

1 square mile equals 2.59 square kilometers.

1 cubic foot equals 0.0283 cubic meter.

1 cubic foot of water weighs 62.5 pounds.

1 cubic meter per minute equals 0.5886 second-foot.

1 horsepower equals 550 foot-pounds per second.

1 horsepower equals 76.0 kilogram-meters per second.

1 horsepower equals 746 watts.

1 horsepower equals 1 second-foot falling 8.80 feet.

1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$=net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharge and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that readings of negative values shall not occur.

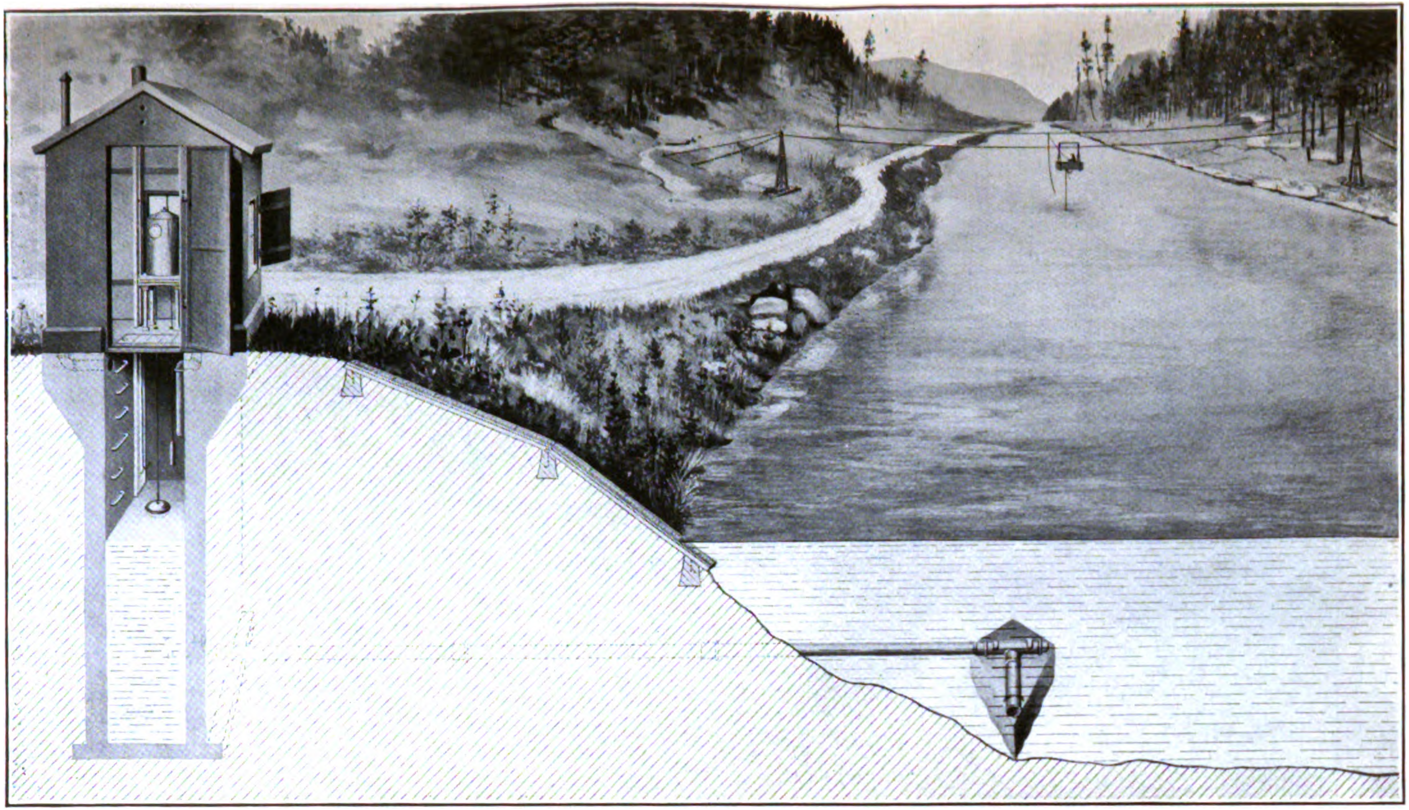
The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage height and daily discharge by plotting gage height in feet as ordinates and discharge in second-feet as abscissas.

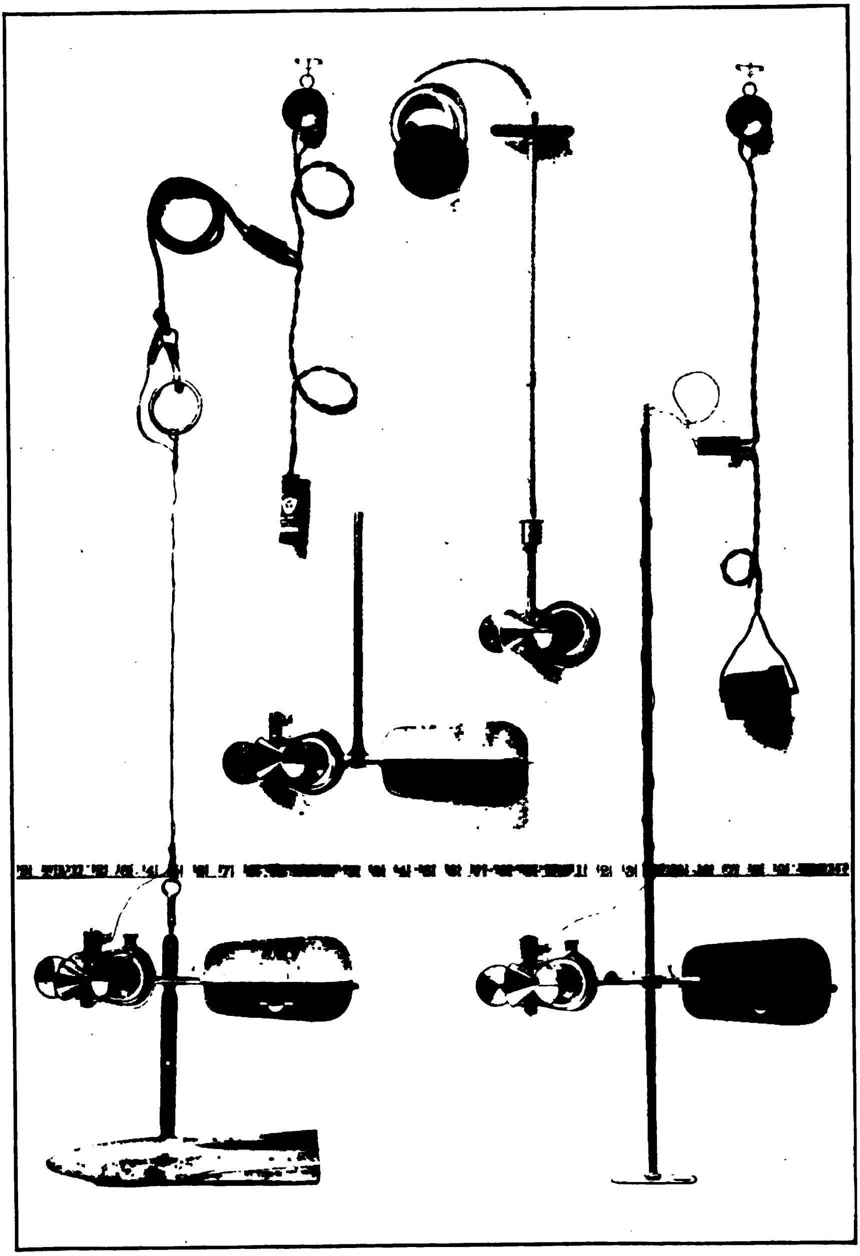
The table of daily discharge gives the discharge in second feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column at "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on pages 11 and 12, are based.

The base data presented in this report, unless otherwise stated in description of station, have been collected by the methods commonly used at current-meter gaging stations and described in standard textbooks. Plate I shows typical gaging stations. Plate II shows current meters used in the work.



TYPICAL GAGING STATIONS.



PRICE CURRENT METERS.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate" within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the survey engineers are published, not only to comply with the law, but also to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates.

The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION.

All gaging stations in Maine were maintained in cooperation with the Maine State Water Storage Commission, William T. Haines, Governor, chairman, and Cyrus C. Babb, chief engineer.

Hydrometric work in Vermont and Massachusetts has been carried on under a cooperative agreement between the governors of the States and the Director of the United States Geological Survey.

In New York hydrometric work is carried on in cooperation with the State Conservation Commission and also with the State engineer and surveyor.

DIVISION OF WORK.

The field data for Maine were collected by Cyrus C. Babb, chief engineer, Maine State Water Storage Commission, assisted by F. E. Pressey, assistant engineer; the ratings and special studies were made by C. C. Babb, assisted by F. E. Pressey and by H. J. Jackson, assistant engineer. Data were prepared for publication and the estimates of flow during the period when the relation of gage height to discharge was affected by ice were made by H. J. Jackson. The computations were made under the direction of H. J. Jackson by C. L. Batchelder, G. A. Wallace, and M. I. Walters.

The field data for New York and New England, outside of Maine, were collected under the direction of C. C. Covert, district engineer, by G. K. Larrison, O. W. Hartwell, C. S. DeGolyer, G. H. Canfield, Frank Weber, J. G. Mathers, and R. S. Barnes. The ratings and studies of completed data were made by O. W. Hartwell, C. H. Pierce, and J. G. Mathers. The computations and ice estimates were made under the direction of O. W. Hartwell by C. H. Pierce, J. G. Mathers, R. S. Barnes, and W. S. Easterly.

The field data for the Middle Atlantic States were collected under the direction of R. H. Bolster by J. G. Mathers.

The complete manuscript was edited by Mrs. B. D. Wood.

STATION RECORDS.

ST. JOHN RIVER BASIN.

ST. JOHN RIVER AT FORT KENT, MAINE.

Location.—At the suspension footbridge in the town of Fort Kent, a short distance above the mouth of Fish River and about 15 miles below the mouth of St. Francis River.

Records available.—October 13, 1905, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—4,880 square miles.

Gage.—Inclined staff, 22 feet long, in two sections, attached to the new concrete pier nearest the New Brunswick shore of the river. The lower part of the gage is placed in a groove in the side of the pier; the upper part is fastened to the downstream end of the same pier. The gage datum has remained unchanged during the maintenance of the station.

Channel.—Practically permanent; both banks high, rocky, cleared, and not subject to overflow except in extreme freshets.

Discharge measurements.—Made from footbridge. None made during 1912.

Winter flow.—Affected by ice.

Artificial control.—A few dams on the upper headwaters are used for log driving; the operation of these dams only slightly affects the flow past the gage. No corrections applied in 1912 data.

Accuracy.—Relation between gage height and discharge is occasionally affected by backwater caused by logs jamming on the bridge piers and, during the winter, by ice; otherwise the conditions for accurate determination of discharge are fair. A fairly good discharge rating curve has been developed.

Daily gage height, in feet, of St. John River at Fort Kent, Maine, for 1912.

[A. V. Currie, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	......	5.1	13.9	16.05	4.95	3.55	4.7	4.3	8.0	5.6
2	......	......	......	......	13.5	16.0	4.8	3.9	4.6	4.7	7.85	5.45
3	......	......	......	......	13.35	13.75	4.65	4.15	4.55	5.15	7.5	5.35
4	......	......	......	......	13.55	12.4	4.55	4.2	4.35	5.35	7.25	5.3
5	......	......	5.2	......	13.85	11.4	4.5	4.1	4.2	5.4	7.0	5.3
6	......	5.6	......	......	13.95	10.7	4.4	4.05	4.1	5.4	6.9	5.2
7	......	......	......	......	14.15	10.2	4.25	3.95	4.05	5.3	6.95	5.2
8	5.9	......	......	......	13.85	9.9	4.1	3.85	4.0	5.25	8.5	5.2
9	......	......	......	6.2	14.4	9.6	4.0	3.9	3.9	5.15	12.5	5.15
10	......	......	......	......	14.55	9.15	3.85	5.25	3.9	5.05	12.35	5.1
11	......	......	......	......	14.5	8.65	3.75	9.25	3.8	4.95	10.85	5.1
12	......	......	5.3	......	13.5	8.4	3.7	12.15	3.8	4.85	9.35	5.05
13	......	5.4	......	......	14.15	9.0	3.65	12.25	3.8	4.75	9.0	5.0
14	......	......	......	......	14.8	10.55	3.6	10.8	3.8	4.7	8.9	5.0
15	......	......	......	......	14.05	10.65	3.55	9.45	3.7	4.7	8.5	5.0
16	6.2	......	......	6.4	12.85	......	3.5	8.35	3.7	4.6	7.95	5.0
17	......	......	......	7.0	11.95	10.25	3.5	7.35	3.7	4.7	7.55	5.0
18	......	......	......	8.2	12.35	10.05	3.5	6.8	3.7	4.65	7.2	5.05
19	......	......	5.2	8.45	13.0	9.5	3.5	6.8	3.7	4.6	6.9	5.2
20	......	5.3	......	8.3	12.45	8.9	3.6	5.9	3.7	4.55	6.85	5.25
21	......	......	......	8.85	11.9	8.35	3.6	5.5	3.7	4.45	6.6	5.3
22	......	......	......	9.7	11.0	7.6	3.5	5.2	......	4.4	6.35	5.3
23	6.0	......	......	10.25	10.2	7.3	3.4	5.3	5.8	4.3	6.3	5.2
24	......	......	......	11.3	10.0	6.9	3.3	5.2	5.65	4.5	6.2	5.15
25	......	......	......	13.2	10.8	6.5	3.35	5.1	5.3	5.2	6.15	5.15
26	......	......	5.1	13.75	......	6.2	3.45	5.3	5.0	7.45	6.1	5.35
27	......	5.2	......	16.55	11.3	5.95	3.55	6.05	4.85	10.05	6.05	5.4
28	......	......	......	16.3	9.9	5.7	3.55	5.85	4.65	10.2	5.9	5.4
29	......	......	......	14.75	9.95	5.45	3.4	5.35	4.45	9.65	5.85	5.3
30	5.8	......	......	14.15	12.5	......	3.5	5.05	4.35	8.55	5.75	5.3
31	......	......	......	......	14.6	......	3.5	4.85	......	8.0	......	5.2

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 19; average thickness of ice, 0.4 to 2.3 feet.

Daily discharge, in second-feet, of St. John River at Fort Kent, Maine, for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		46,100	59,400	4,760	1,740	4,110	3,140	15,800	6,690
2		43,700	59,100	4,370	2,320	3,860	4,110	15,200	6,220
3		42,800	45,200	3,980	2,820	3,740	5,320	13,700	5,920
4		44,000	37,400	3,740	2,920	3,260	5,920	12,700	5,770
5		45,800	32,000	3,610	2,710	2,920	6,070	11,700	5,770
6		46,400	28,400	3,370	2,610	2,710	6,070	11,300	5,470
7		47,600	25,900	3,030	2,420	2,610	5,770	11,500	5,470
8		45,800	24,400	2,710	2,230	2,510	5,620	18,000	5,470
9		49,100	23,000	2,510	2,320	2,320	5,320	38,000	5,320
10		50,000	20,900	2,230	5,620	2,320	5,040	37,100	5,180
11		49,700	18,600	2,060	21,400	2,140	4,760	29,100	5,180
12		43,700	17,500	1,970	36,000	2,140	4,500	21,800	5,040
13		47,600	20,200	1,890	36,600	2,140	4,240	20,200	4,900
14		51,600	27,600	1,810	28,900	2,140	4,110	19,800	4,900
15		47,000	28,100	1,740	22,300	1,970	4,110	18,000	4,900
16		39,900	27,100	1,660	17,300	1,970	3,860	15,600	4,900
17		34,900	26,100	1,660	13,100	1,970	4,110	13,900	4,900
18		37,100	25,100	1,660	10,900	1,970	3,980	12,500	5,040
19		40,800	22,500	1,660	9,040	1,970	3,860	11,300	5,470
20	17,100	37,700	19,800	1,810	7,660	1,970	3,740	11,100	5,620
21	19,500	34,700	17,300	1,810	6,380	1,970	3,490	10,100	5,770
22	23,500	29,900	14,100	1,660	5,470	2,500	3,370	9,220	5,770
23	26,100	25,900	12,900	1,520	5,770	7,330	3,140	9,040	5,470
24	31,500	24,900	11,300	1,390	5,470	6,850	3,610	8,690	5,320
25	42,000	28,900	9,770	1,460	5,180	5,770	5,470	8,520	5,320
26	45,200	33,000	8,690	1,590	5,770	4,900	13,500	8,340	5,920
27	62,700	31,500	7,830	1,740	8,170	4,500	25,100	8,170	6,070
28	61,000	24,400	7,010	1,740	7,500	3,980	25,900	7,660	6,070
29	51,300	24,700	6,220	1,520	5,920	3,490	23,200	7,500	5,770
30	47,600	38,000	5,490	1,600	5,040	3,260	18,200	7,170	5,770
31		50,300		1,660	4,500		15,800		5,470

NOTE.—Daily discharge computed from a fairly well defined rating curve. Discharge Jan. 1 to Apr. 19 estimated, because of ice, from weekly gage heights, observer's notes, climatologic records, and discharge of other drainage areas. It should be noted that these estimates are only approximate and may be 50 per cent or more in error. Estimated mean discharge January, 1,400 second-feet; February, 900 second-feet; March, 1,600 second-feet; Apr. 1 to 19, 3,500 second-feet. Daily discharge May 26 and Sept. 22 estimated by comparison with flow at Van Buren. Daily discharge June 16 and 30 interpolated.

Monthly discharge of St. John River at Fort Kent, Maine, for 1912.

[Drainage area, 4,880 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			1,400	0.287	0.33	
February			900	.184	.20	
March			1,600	.328	.38	
April	62,700		16,500	3.38	3.77	D.
May	51,600	24,400	39,900	8.18	9.43	B.
June	59,400	5,490	23,000	4.71	5.26	B.
July	4,760	1,390	2,260	.463	.53	A.
August	36,600	1,740	9,550	1.96	2.26	B.
September	7,330	1,970	3,180	.652	.73	A.
October	25,900	3,140	7,560	1.55	1.79	A.
November	38,000	7,170	14,800	3.03	3.38	A.
December	6,690	4,900	5,520	1.13	1.30	B.
The year	62,700		10,500	2.15	29.36	

NOTE.—See footnotes to table of daily discharge.

ST. JOHN RIVER AT VAN BUREN, MAINE.

Location.—At new International Bridge at Van Buren, Maine, about 14 miles above Grand Falls, New Brunswick.

Records available.—May 4, 1908, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—8,270 square miles.

Gage.—Painted vertically on second pier from Van Buren side of bridge; zero of gage is 407.69 feet above sea level; daily gage heights for 1910 and 1911 were read on a vertical rod attached to the pier of the sawdust carrier of Hammonds mill, about 700 feet below the International Bridge, but as published they are reduced to the bridge datum. Daily gage heights for 1912 were read on the gage at the International Bridge and no reduction was necessary.

Discharge measurements.—Made from the International Bridge. None made during 1912.

Winter flow.—Affected by ice.

Artificial control.—The little storage above for log driving probably does not affect the discharge.

Accuracy.—Relation between gage heights and discharge is probably not materially affected by the control of the stream for log driving; for the winter months an ice rating curve has been developed. A good open-channel discharge rating curve has also been constructed.

Cooperation.—Station established by the International Commission, River St. John, but maintained since May 6, 1912, by the Maine State Water Storage Commission.

Daily gage height, in feet, of St. John River at Van Buren, Maine, for 1912.

[W. H. Scott, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	22.9	6.6	3.05	4.45	3.2	9.75	6.8
2	....	23.3	6.25	3.75	4.25	3.15	9.5	6.8
3	....	21.5	5.95	3.95	3.95	3.3	9.1	7.0
4	....	19.55	5.65	3.65	3.75	3.25	8.95	8.4
5	....	17.85	5.35	3.5	3.65	3.4	8.5	9.75
6	18.8	16.55	5.15	3.2	3.45	4.5	7.95	11.0
7	19.35	15.55	4.85	3.0	3.4	4.4	7.75	11.55
8	19.6	14.9	4.65	2.95	3.25	4.25	10.35	11.2
9	20.15	14.3	4.45	2.85	3.1	3.95	14.95	10.25
10	21.35	13.55	4.25	3.5	3.0	3.75	16.6	9.45
11	21.6	12.85	3.95	6.15	3.1	3.55	14.65	9.95
12	20.9	12.45	3.75	13.45	3.2	3.4	13.2	10.25
13	21.0	12.45	3.5	15.6	3.1	3.3	12.2	9.8
14	22.2	14.25	3.45	14.4	3.0	3.3	11.2	8.4
15	22.75	14.8	3.65	12.5	3.0	3.4	10.65	7.6
16	21.3	14.05	3.45	10.65	3.0	3.3	10.0	8.1
17	19.55	13.65	3.3	9.25	2.95	3.35	9.35	8.45
18	19.3	13.95	3.2	8.05	2.9	3.45	9.05	8.05
19	19.9	13.9	3.05	7.3	2.8	3.35	8.75	7.8
20	19.45	13.05	3.0	6.65	2.7	3.25	8.35	8.0
21	17.85	12.2	3.0	5.7	2.7	3.2	8.05	7.85
22	16.3	11.35	3.0	5.15	2.75	3.2	7.85	7.3
23	15.05	10.55	3.0	5.55	3.45	3.2	7.6	7.0
24	14.4	9.8	2.9	5.4	4.9	3.35	7.55	7.05
25	15.4	9.1	2.8	5.4	4.6	4.1	7.45	7.15
26	17.7	8.6	2.85	5.25	4.05	7.55	8.35	7.0
27	17.25	8.1	2.95	5.3	3.85	12.75	7.7	6.85
28	15.6	7.6	2.85	5.4	3.6	13.95	7.1	6.65
29	14.8	7.15	2.75	5.4	3.45	12.65	6.75	6.35
30	17.45	6.9	2.65	5.1	3.2	11.45	6.8	6.0
31	20.5	....	2.85	4.85	....	10.5	....	6.0

NOTE.—Gage heights are referred to datum of gage on International Bridge. To reduce readings to elevation above sea level add 407.7 feet. May 6–14, logs running. Dec. 8, observer notes: "River froze up solid last night." Relation of gage height to discharge probably affected by ice about Dec. 4–14.

Daily discharge in second-feet of St. John River at Van Buren, Maine, for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	100,000	14,900	5,680	9,100	6,030	25,400	15,500
2	....	103,000	13,900	7,350	8,600	5,920	24,500	15,500
3	....	89,900	13,100	7,840	7,840	6,260	23,000	16,100
4	....	76,400	12,200	7,110	7,350	6,150	22,500	....
5	....	65,600	11,400	6,740	7,110	6,500	20,900	....
6	71,600	57,900	10,900	6,030	6,620	9,230	19,100	....
7	75,100	52,300	10,100	5,570	6,500	8,980	18,400	....
8	76,800	48,800	9,610	5,460	6,150	8,600	27,700	....
9	80,500	45,700	9,100	5,230	5,800	7,840	49,100	....
10	88,900	42,000	8,600	6,740	5,570	7,350	58,200	....
11	90,700	38,600	7,840	13,600	5,800	6,860	47,500	....
12	85,700	36,700	7,350	41,500	6,030	6,500	40,300	....
13	86,400	36,700	6,740	52,600	5,800	6,260	35,500	....
14	95,100	45,400	6,620	46,200	5,570	6,260	31,200	....
15	99,200	48,300	7,110	36,900	5,570	6,500	28,900	17,900
16	88,500	44,400	6,620	28,900	5,570	6,260	26,400	19,600
17	76,400	42,500	6,260	23,600	5,460	6,380	23,900	20,800
18	74,800	44,000	6,030	19,400	5,340	6,620	22,800	19,400
19	78,800	43,700	5,680	17,000	5,120	6,380	21,800	18,600
20	75,800	39,500	5,570	15,000	4,900	6,150	20,400	19,200
21	65,600	35,500	5,570	12,400	4,900	6,030	19,400	18,700
22	56,500	31,800	5,570	10,900	5,010	6,030	18,700	17,000
23	49,600	28,500	5,570	12,000	6,620	6,030	17,900	16,100
24	46,200	25,600	5,340	11,600	10,300	6,380	17,800	16,200
25	51,500	23,000	5,120	11,600	9,480	8,220	17,400	16,500
26	64,700	21,300	5,230	11,200	8,100	17,800	20,400	16,100
27	62,000	19,600	5,460	11,300	7,600	38,100	18,200	15,600
28	52,600	17,900	5,230	11,600	6,980	44,000	16,400	15,000
29	48,300	16,500	5,010	11,600	6,620	37,600	15,300	14,200
30	63,200	15,800	4,780	10,800	6,030	32,200	15,500	13,200
31	82,900	....	5,230	10,100	....	28,300	....	13,200

NOTE.—Daily discharge computed from a rating curve well defined below 73,000 second-feet. Discharge Dec. 4-14 estimated, because of ice, from observer's notes and comparison with discharge at Fort Kent. Mean discharge Dec. 4-14 estimated 21,000 second-feet, varying from about 19,000 to 25,000 second-feet.

Monthly discharge of St. John River at Van Buren, Maine, for 1912.

[Drainage area, 8,270 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May 6-31	99,200	46,200	72,600	8.78	8.49	B.
June	103,000	15,800	44,600	5.39	6.01	A.
July	14,900	4,780	7,670	.927	1.07	A.
August	52,600	5,230	15,600	1.89	2.18	A.
September	10,300	4,900	6,580	.796	.89	A.
October	44,000	5,920	11,900	1.44	1.66	A.
November	58,200	15,300	25,500	3.08	3.44	A.
December	(a)	13,200	18,200	2.20	2.54	C.

[a] See footnote to table of daily discharge.

ST. CROIX RIVER BASIN.

WEST BRANCH OF ST. CROIX RIVER NEAR BAILEYVILLE, MAINE.

Location.—At highway bridge 1 mile from Baileyville railroad station, about 4 miles below Princeton, and about half a mile above the mouth of Tomah Stream.

Records available.—May 10, 1910, to October 24, 1912, when station was discontinued. The dam under construction at Grand Falls, 3 miles below, will flood this station out—probably early in the spring of 1913.

Drainage area.—509 square miles.

Gage.—Standard chain, attached to the floor of the bridge on the easterly span.

Channel.—Practically permanent; broken by four piers of the bridge; during extreme high stages water is liable to flow around abutments of the bridge.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—River generally does not freeze completely over.

Artificial control.—The lake system on West Branch is extensive and is largely under artificial regulation. The dams are operated both for log driving and storage powers below.

Accuracy.—Relation between gage height and discharge probably somewhat affected by ice during the winter and to some extent also by backwater from log jams. Results of discharge measurements are too discordant to warrant publishing estimates of discharge based thereon. Discordant results may be due to effect of log jams, but there are no data available upon which to base an interpretation of the results.

Discharge measurements of West Branch of St. Croix River near Baileyville, Maine, in 1912.

[Hydrographer, F. E. Pressey.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-feet.*		*Feet.*	*Sec.-feet.*
March 20	[a]5.98	473	May 7	5.29	1,000
April 24	9.00	3,270	May 8	5.14	974
April 25	8.92	2,950	May 10	5.31	890
April 26	8.60	3,080			

[a] Ice jam below station.

Daily gage height, in feet, of West Branch of St. Croix River near Baileyville, Maine, for 1912.

[Mrs. W. M. Woodard, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.
1	5.50	4.85	4.70	5.30	5.82	8.05	5.45	4.75	4.55	5.1
2	5.30	5.00	4.70	5.40	5.70	8.30	5.42	4.85	4.40	5.7
3	5.15	4.95	4.65	5.60	5.50	8.20	5.40	5.05	4.45	6.2
4	5.70	4.95	4.68	5.55	5.50	7.85	4.90	4.95	4.48	5.5
5	5.95	4.95	4.65	5.50	5.50	7.38	4.80	5.22	4.45	5.0
6	5.75	4.90	4.72	5.65	5.50	6.95	4.85	5.10	4.50	4.95
7	5.60	4.80	4.70	5.75	5.38	6.80	4.90	4.70	4.50	5.55
8	5.55	4.60	4.75	5.90	5.15	6.15	4.80	4.65	4.50	5.4
9	5.40	4.62	4.72	5.88	5.12	6.12	4.68	4.65	4.40	5.95
10	5.65	4.75	4.70	5.50	5.32	6.05	4.50	4.78	4.35	6.0
11	5.85	4.72	4.58	5.60	5.42	5.85	4.40	4.75	4.35	6.0
12	6.15	4.62	4.62	5.60	5.42	5.50	4.45	4.60	4.30	5.4
13	6.15	4.62	4.80	5.48	5.45	5.60	4.50	4.52	4.40	4.35
14	5.12	4.52	4.90	5.55	5.42	5.62	4.52	4.62	4.50	5.25
15	5.15	4.60	4.60	5.45	5.35	5.60	4.95	4.70	4.45	5.5
16	5.22	4.50	4.80	6.10	5.42	5.50	5.20	4.60	4.55	5.6
17	5.20	4.50	5.60	6.35	5.42	5.50	5.05	5.90	4.45	5.1
18	5.10	4.30	5.80	6.88	5.48	5.52	5.10	5.85	4.30	4.95
19	5.08	4.30	5.80	7.75	5.45	5.38	5.20	5.45	4.42	4.55
20	5.00	4.80	6.00	8.75	5.40	5.45	4.60	5.45	4.52	4.55
21	4.80	4.70	6.02	8.95	5.30	5.60	4.45	5.15	4.50	5.45
22	4.80	4.75	5.80	8.75	5.12	5.55	4.60	5.22	4.45	5.0
23	5.05	4.75	5.85	8.70	5.10	4.95	4.80	5.15	4.58	4.5
24	5.00	5.30	5.52	9.05	5.30	5.52	4.70	5.15	4.55	4.6
25	4.95	4.60	5.20	9.05	5.22	5.55	4.75	5.05	4.60	....
26	4.80	4.75	5.05	8.62	5.28	5.52	4.70	4.70	4.60	....
27	4.90	4.80	6.28	8.30	5.15	5.40	4.75	4.80	4.60	....
28	4.70	4.90	5.45	7.50	5.30	4.90	4.75	4.65	4.58	....
29	5.08	4.85	5.30	6.98	5.20	4.90	4.58	4.68	4.55	....
30	5.00	....	5.40	6.25	6.05	4.70	4.50	4.62	4.62	....
31	4.95	....	5.20	....	7.10	....	4.80	4.60	....	....

Note.—Relation of gage height to discharge probably affected by ice Jan. 1 to about Apr. 15.

MACHIAS RIVER BASIN.

MACHIAS RIVER AT WHITNEYVILLE, MAINE.

Location.—Wooden highway bridge in the town of Whitneyville; 4 miles above Machias; 200 feet below a storage dam.

Records available.—October 17, 1903, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—465 square miles.

Gage.—A standard chain gage installed on the wooden highway bridge October 10, 1911. Prior to October 3, 1905, a chain gage was located on the Washington County railroad bridge. Backwater was occasionally experienced here, however, from the dam at Machias, and on October 3, 1905, a staff gage was installed on the highway bridge three-fourths mile farther up stream. The datum of the present chain gage is the same as that of the staff gage on the highway bridge.

Channel.—Practically permanent.

Discharge measurements.—Still made at the railroad bridge, as the section there is better than above. Low-water measurements may be made by wading at a point 200 feet above the railroad bridge.

Winter flow.—River does not ordinarily freeze over at the gage, although the relation of gage height to discharge is more or less affected by ice.

Log driving.—There is a certain amount of log driving every year and jams of short duration occasionally occur.

Artificial control.—The gates in the storage dam immediately above the station are opened and closed each day during low stages of the river; as a result considerable fluctuation occurs at such times.

Accuracy.—A fair rating curve has been developed except at low stages, when quantities are somewhat uncertain. The operations of the gates of the storage dam also render results somewhat uncertain.

The following discharge measurement was made by F. E. Pressey:

March 21, 1912: Gage height, 8.25 feet; discharge, 2,850 second-feet. Considerable anchor ice was running during the measurement.

Daily gage height, in feet, of Machias River at Whitneyville, Maine, for 1912.

[Ira S. Albee, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.3	4.4	4.9	6.8	6.5	10.0	3.3	3.6	3.8	3.6	5.4	4.5
2	4.2	4.4	4.8	6.5	6.4	9.4	3.3	4.0	3.8	3.7	5.6	4.6
3	4.2	4.4	4.8	6.1	6.2	9.0	3.3	4.2	3.7	3.8	5.8	4.8
4	4.1	4.35	4.7	5.8	6.0	8.7	3.3	4.3	3.65	3.9	5.7	5.6
5	4.0	4.3	4.6	5.6	6.1	8.4	3.3	4.3	3.6	4.0	5.3	5.4
6	3.9	4.3	4.5	5.4	6.2	8.0	3.2	4.1	3.6	4.0	5.0	5.3
7	3.9	4.3	4.4	5.2	6.3	7.5	3.2	3.9	3.6	4.0	4.8	5.2
8	4.0	4.25	4.4	5.15	6.4	7.0	3.2	3.8	3.6	3.9	5.3	5.0
9	4.1	4.2	4.4	5.1	6.4	6.5	3.1	3.7	3.6	3.8	7.2	4.9
10	4.3	4.2	4.4	5.1	6.0	6.3	3.1	3.7	3.6	3.7	9.1	4.8
11	4.3	4.2	4.45	5.05	5.7	6.2	3.1	3.7	3.6	3.6	7.8	4.7
12	4.3	4.2	4.5	5.0	5.8	6.1	3.1	3.7	3.6	3.5	6.6	4.5
13	4.2	4.1	4.7	4.9	5.8	6.0	3.1	3.7	3.6	3.5	6.2	4.4
14	4.2	4.0	7.0	4.9	5.8	6.0	3.1	3.8	3.6	3.4	5.9	4.3
15	4.2	3.9	7.9	5.0	5.8	5.8	3.1	3.8	3.6	3.4	5.7	4.2
16	4.2	3.8	11.0	5.1	6.0	5.6	3.5	3.8	3.6	3.4	5.6	4.1
17	4.2	3.8	12.1	5.2	6.0	5.4	3.9	3.75	3.65	3.5	5.5	4.1
18	4.2	3.8	11.1	5.3	7.2	5.3	3.9	3.7	3.7	3.6	5.4	4.1
19	4.5	3.8	9.4	5.4	6.0	4.9	3.9	3.7	3.7	3.7	5.3	4.8
20	5.0	3.8	9.1	6.0	5.8	4.6	3.9	3.7	3.8	3.7	5.2	6.5

Daily gage height, in feet, of Machias River at Whitneyville, Maine, for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	5.2	3.8	8.2	7.0	5.2	4.3	4.1	3.7	3.9	3.7	5.0	6.2
22	5.2	4.5	7.6	7.3	4.7	4.0	4.2	3.7	4.0	3.7	4.9	5.4
23	5.2	5.6	7.0	7.9	4.2	3.6	4.3	3.7	3.9	3.7	4.8	5.3
24	5.1	6.1	6.4	8.3	4.2	3.5	4.4	3.7	3.8	3.9	4.7	5.2
25	5.0	5.9	6.0	8.0	4.8	3.4	4.4	3.75	3.7	6.3	5.0	5.2
26	4.9	5.5	5.6	7.8	4.9	3.4	4.3	3.8	3.6	10.6	5.7	5.2
27	4.8	5.3	5.2	7.4	4.9	3.4	4.1	3.85	3.5	9.7	5.5	5.3
28	4.7	5.1	5.2	7.1	4.9	3.35	3.8	3.9	3.5	8.3	5.1	5.4
29	4.6	5.0	6.0	6.8	4.9	3.35	3.6	3.9	3.5	7.4	4.9	5.4
30	4.4	....	7.2	6.6	6.9	3.3	3.5	3.9	3.5	5.9	4.7	5.6
31	4.4	....	7.4	....	9.2	....	3.5	3.8	....	5.3	....	6.6

NOTE.—Relation of gage height to discharge probably affected by ice about Mar. 14 to 26. No notes relating to log jams, but there may have been some backwater from logs for short periods during April, May, and June.

Daily discharge, in second-feet, of Machias River at Whitneyville, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	642	698	1,000	2,470	2,200	5,680	191	300	387	300	1,350	755
2	587	698	937	2,200	2,120	5,020	191	482	387	343	1,490	814
3	587	698	937	1,880	1,960	4,580	191	587	343	387	1,640	937
4	534	670	875	1,640	1,800	4,280	191	642	322	433	1,560	1,490
5	482	642	814	1,490	1,880	3,980	191	642	300	482	1,280	1,350
6	433	642	755	1,350	1,960	3,580	161	534	300	482	1,070	1,280
7	433	642	698	1,210	2,040	3,100	161	433	300	482	937	1,210
8	482	614	698	1,180	2,120	2,650	161	387	300	433	1,280	1,070
9	534	587	698	1,140	2,120	2,200	132	343	300	387	2,830	1,000
10	642	587	698	1,140	1,800	2,040	132	343	300	343	4,690	937
11	642	587	726	1,100	1,560	1,960	132	343	300	300	3,380	875
12	642	587	755	1,070	1,640	1,880	132	343	300	260	2,290	755
13	587	534	875	1,000	1,640	1,800	132	343	300	260	1,960	698
14	587	482	....	1,000	1,640	1,800	132	387	300	224	1,720	642
15	587	433	....	1,070	1,640	1,640	132	387	300	224	1,560	587
16	587	387	....	1,140	1,800	1,490	260	387	300	224	1,490	534
17	587	387	....	1,210	2,290	1,350	433	365	322	260	1,420	534
18	587	387	....	1,260	2,830	1,280	433	343	343	300	1,350	534
19	755	387	....	1,350	1,800	1,000	433	343	343	343	1,280	937
20	1,070	387	....	1,800	1,640	814	433	343	387	343	1,210	2,200
21	1,210	387	....	2,650	1,210	642	534	343	433	343	1,070	1,960
22	1,210	755	....	2,920	875	482	587	343	482	343	1,000	1,350
23	1,210	1,490	....	3,480	587	300	642	343	433	343	937	1,280
24	1,140	1,880	....	3,880	587	260	698	343	387	433	875	1,210
25	1,070	1,720	....	3,580	937	224	698	365	343	2,040	1,070	1,210
26	1,000	1,420	....	3,380	1,000	224	642	387	300	6,340	1,560	1,210
27	937	1,280	1,210	3,010	1,000	224	534	410	260	5,350	1,420	1,280
28	875	1,140	1,210	2,740	1,000	208	387	433	260	3,880	1,140	1,350
29	814	1,070	1,800	2,470	1,000	208	300	433	260	3,010	1,000	1,350
30	698	....	2,830	2,290	2,560	191	260	433	260	1,720	875	1,490
31	698	....	3,010	....	4,800	....	260	387	....	1,280	....	2,290

NOTE.—Daily discharge computed from a rating curve well defined between 200 and 4,000 second-feet. Discharge Mar. 14 to 26 estimated, because of ice, from one discharge measurement, observer's notes, and climatologic records. Mean discharge Mar. 14 to 26 estimated 2,700 second-feet, varying from about 1,300 to 5,000 second-feet.

Monthly discharge of Machias River at Whitneyville, Maine, for 1912.

[Drainage area, 465 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,210	433	737	1.58	1.82	C.
February	1,880	387	765	1.65	1.78	B.
March	(a)	698	1,790	3.85	4.44	C.
April	3,880	1,000	1,940	4.17	4.65	B.
May	4,800	587	1,740	3.74	4.31	B.
June	5,680	191	1,840	3.96	4.42	B.
July	698	132	319	.686	.79	C.
August	642	300	403	.867	1.00	B.
September	482	260	328	.705	.79	B.
October	6,340	224	1,030	2.22	2.56	B.
November	4,690	875	1,560	3.35	3.74	B.
December	2,290	534	1,130	2.43	2.80	B.
The year	6,340	132	1,130	2.43	33.10	

a See footnotes to table of daily discharge.

UNION RIVER BASIN.

UNION RIVER AT AMHERST, MAINE.

Location.—At highway bridge three-fourths of a mile west of Amherst post office on road to Bangor, about a mile below the highway bridge at the old tannery dam.

Records available.—July 25, 1909, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—140 square miles.

Gage.—Standard chain, established June 2, 1910, and placed at same datum as old vertical gage nailed to log abutment.

Channel.—Gravel, but not liable to change except in an unusual flood.

Discharge measurements.—Made from downstream side of the bridge.

Winter flow.—Affected by ice.

Artificial control.—A few log-driving dams above the station, but the regimen of stream is only slightly affected by them.

Accuracy.—Relation between gage height and discharge is affected by ice and to a certain extent, but for short periods, by backwater from log jams. A good rating curve has been developed under 700 second-feet. Discharge values above that point should be used with caution. No corrections have been made for possible backwater from log jams.

Discharge measurements of Union River at Amherst, Maine, in 1912.

[F. E. Pressey, hydrographer.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
April 10	9.22	685	May 15	8.28	549	May 22	7.58	391
10	9.26	688	15	8.25	547	22	7.56	385
10	9.26	671	15	8.24	535	22	7.54	374
11	9.17	639	16	8.12	515	22	7.52	369
11	9.18	650	16	8.12	513	22	7.52	374
11	9.26	678	16	8.10	501	23	7.48	374
11	9.22	634	17	8.22	537	23	7.48	363
12	9.17	654	17	8.22	527	24	7.46	364
12	9.10	646	21	7.70	410	24	7.46	363
May 14	8.40	559	21	7.70	408	24	7.46	362
14	8.40	583	21	7.68	422	24	7.46	362
14	8.40	581	21	7.68	408	24	7.46	362
14	8.40	597	21	7.66	402	Sept. 6	5.67	57
15	8.29	553	22	7.58	421	6	5.67	56

Daily gage height, in feet, of Union River at Amherst, Maine, for 1912.

[Mrs. Clara Nickerson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	......	9.25	8.98	9.80	5.97	5.85	5.81	5.94	8.50	7.15
2	......	......	8.68	9.20	8.70	9.90	5.92	5.85	5.80	5.94	8.86	7.42
3	10.48	8.60	......	9.12	8.45	10.00	5.88	5.90	5.78	5.95	8.72	7.44
4	......	......	......	9.00	8.20	10.00	5.80	6.21	5.76	5.99	8.46	7.46
5	......	......	......	8.90	7.88	9.80	5.77	6.05	5.71	6.00	8.28	7.38
6	9.90	......	8.60	8.65	7.80	9 47	5.72	6.05	5.67	6.61	8.08	7.38
7	......	8.30	......	8.57	7.70	9.09	5.69	6.05	5.62	6.00	7.98	7.68
8	......	......	......	9.35	7.60	8.70	5.63	6.00	5.60	5.98	9.25	7.87
9	......	......	8.40	9.22	7.80	8.33	5.60	6.00	5.57	5.94	9.65	7.42
10	10.10	8.25	......	9.22	7.95	7.95	5.58	5.92	5.52	5.91	9.25	7.99
11	......	......	......	9.17	8.05	7.72	5.56	5.91	5.57	5.88	9.00	7.58
12	......	......	......	9.14	8.05	7.48	5.56	5.88	5.57	5.89	8.90	7.10
13	9.65	......	9.00	9.00	8.08	7.58	5.57	5.85	5.55	5.96	8.75	7.75
14	......	8.00	......	8.84	8.40	7.50	5.51	5.85	.5.51	5.91	8.60	8.08
15	......	......	......	8.69	8.29	7.40	5.48	6.15	4.84	5.88	8.50	8.32
16	......	......	14.10	8.60	8.12	7.28	5.41	6.10	5.57	5.87	8.40	7.99
17	9.50	7.80	......	8.82	8.22	7.25	5.38	6.15	5.67	5.84	8.23	7.05
18	......	......	......	8.94	8.15	7.18	5.35	6.16	5.59	5.82	8.12	7.20
19	......	......	......	10.19	7.95	7.03	5.45	6.16	5.77	5.80	7.99	6.80
20	9.65	......	12.60	10.67	7.79	6.92	5.37	6.15	5.84	6.02	7.89	7.05
21	......	7.80	......	10.87	7.70	6.81	5.31	5.18	5.98	5.99	7.73	7.34
22	......	......	......	10.90	7.58	6.70	6.16	6.10	6.00	5.98	7.60	8.05
23	......	......	11.50	11.37	7.45	6.60	6.01	6.00	5.99	5.98	7.54	8.52
24	9.28	8.80	......	11.60	7.46	6.52	5.80	5.05	5.97	6.08	7.36	8.92
25	......	......	......	10.92	7.54	6.43	5.84	5.18	5.97	7.78	7.37	9.42
26	......	......	......	10.52	7.44	6.35	5.89	5.19	5.95	8.47	7.44	8.60
27	9.05	......	8.82	10.25	7.37	6.26	5.80	5.18	5.91	8.30	7.35	8.50
28	......	8.85	8.50	9.90	7.30	6.20	5.87	5.19	5.87	8.19	7.25	......
29	......	......	8.42	9.45	7.20	6.11	5.88	5.16	5.81	8.40	7.19	8.55
30	......	......	9.75	9.27	8.03	6.03	5.85	5.19	6.00	8.68	7.09	8.55
31	8.80	......	9.60	......	9.40	......	5.80	5.17	......	8.62	......	9.44

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 17. Probably no material effect from ice during December.

Daily discharge, in second-feet, of Union River at Amherst, Maine, for 1909–1912.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.						
1	......	36	17	1,150	236	628
2	......	34	18	984	212	566
3	......	31	18	934	206	515
4	......	28	16	869	390	......
5	......	26	15	783	380	......
6	......	24	19	648	358	......
7	......	23	17	513	336	......
8	......	23	16	450	304	......
9	......	22	15	404	306	......
10	......	22	14	325	274	......
11	......	23	16	282	260	......
12	......	21	16	243	245	......
13	......	18	15	224	239	......
14	......	18	15	192	222	......
15	......	15	15	171	208	......
16	......	16	15	217	199	......
17	......	16	15	208	182	......
18	......	24	16	192	212	......
19	......	22	18	190	204	......
20	......	22	18	173	190	......
21	......	21	16	156	188	
22	......	19	16	164	187	......
23	......	19	16	164	185	......
24	......	21	19	173	182	......
25	56	19	22	190	251	......
26	55	16	19	241	913	......
27	51	16	143	241	738	......
28	47	19	254	264	679	......
29	42	18	2,110	294	648	......
30	40	18	1,400	284	628	......
31	40	18	......	249	......	......

Daily discharge, in second-feet, of Union River at Amherst, Maine, for 1909–1912—Con.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.										
1		568	738	173	161	40	34	38	63	72
2		592	753	173	153	40	33	38	57	72
3		585	580	158	130	41	28	37	55	81
4		568	580	150	175	44	24	34	55	
5		556	556	137	134	222	24	37	57	
6		532	532	125	119	170	23	35	57	
7		544	503	118	106	178	34	35	60	
8		556	461	113	118	190	31	37	58	
9		556	426	113	110	187	30	35	63	
10	830	537	392	113	92	178	30	36	61	
11	605	532	358	112	81	176	30	34	61	
12	605	508	325	103	74	126	28	32	61	
13	580	450	304	150	67	110	28	31	57	
14	556	410	274	138	58	96	53	29	55	
15	508	369	254	128	55	83	47	28	53	
16	472	343	236	122	54	73	47	27	51	
17	450	304	208	113	53	66	53	27	53	
18	426	284	187	161	49	63	55	26	50	
19	369	380	190	173	43	66	53	26	46	
20	329	585	176	182	41	71	49	24	48	
21	343	635	159	178	43	49	47	24	48	
22	345	688	148	187	41	49	44	22	80	
23	329	710	140	175	41	47	40	23	39	
24	321	682	132	164	41	48	40	23	53	
25	336	682	128	158	41	53	38	23	53	
26	461	669	128	146	41	46	38	24	53	
27	461	966	156	137	47	42	36	37	47	
28	461	862	159	148	40	42	39	44	49	
29	461	768	156	153	40	39	38	49	57	
30	496	682	156	156	40	39	37	57	59	
31	508		170		38	34		50		

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.									
1		869	170	96	103	52	70	40	270
2		830	199	78	125	53	66	37	308
3		768	190	72	140	52	65	35	461
4		669	173	68	143	51	65	34	
5		605	170	63	128	44	83	33	
6		556	164	59	110	40	78	31	
7		484	140	72	96	47	68	34	
8		461	125	63	83	47	65	83	
9		410	110	61	72	47	49	66	
10		358	96	57	68	49	35	57	204
11	1,030	347	83	53	68	47	35	55	201
12	1,010	336	83	49	63	46	38	55	212
13	1,000	317	110	47	59	63	37	78	215
14	852	304	156	46	55	63	34	83	219
15	1,400	284	173	40	46	55	34	93	219
16	1,250	270	245	40	51	68	35	176	219
17	1,180	245	369	37	46	65	38	164	217
18	1,220	226	325	37	44	63	53	148	217
19	1,180	208	304	40	47	57	41	208	
20	1,150	195	284	39	47	59	34	208	
21	1,130	182	264	37	49	63	27	194	
22	1,000	173	245	37	51	63	28	190	
23	896	208	208	40	53	68	55	217	
24	846	226	173	40	51	68	47	173	
25	798	241	140	44	47	68	41	208	
26	798	245	125	44	44	69	37	217	
27	798	236	110	55	40	71	35	204	542
28	830	226	96	53	39	68	35	190	600
29	830	208	103	72	44	68	35	264	710
30	930	199	103	90	47	72	34	319	800
31		173		83	52		34		1,000

Daily discharge, in second-feet, of Union River at Amherst, Maine, for 1909–1912—Con.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.									
1	....	732	1,000	92	78	73	88	605	294
2	....	656	1,040	86	78	72	88	699	351
3	....	592	1,070	81	83	70	90	661	356
4	....	532	1,070	72	126	68	95	595	360
5	....	456	1,000	69	103	64	96	551	343
6	....	438	886	65	103	61	192	503	343
7	....	415	765	62	103	57	96	479	410
8	....	392	656	57	96	55	93	814	454
9	....	438	563	55	96	53	88	948	351
10	....	472	472	53	86	49	84	814	482
11	....	496	420	52	84	53	81	738	387
12	....	496	365	52	81	53	82	710	284
13	....	503	387	53	78	51	91	669	426
14	....	580	369	48	78	48	84	630	503
15	....	554	347	46	118	14	81	605	561
16	....	513	321	41	110	53	80	580	482
17	....	537	314	39	118	61	76	539	274
18	721	520	300	37	119	54	74	513	304
19	1,140	472	270	44	119	69	72	482	236
20	1,320	436	249	38	118	76	99	459	274
21	1,390	415	228	35	27	93	95	422	334
22	1,400	387	208	119	110	96	93	392	496
23	1,590	358	190	97	96	95	93	378	610
24	1,680	360	176	72	21	92	107	338	716
25	1,410	378	161	76	27	92	433	340	869
26	1,260	356	148	82	28	90	598	356	630
27	1,160	340	134	72	27	84	556	336	605
28	1,040	325	125	80	28	80	530	314	612
29	879	304	112	81	26	73	580	302	618
30	820	491	100	78	28	96	651	282	618
31	....	862	....	72	26	....	635	....	876

NOTE.—Daily discharge computed from a rating curve well defined between 15 and 700 second-feet. The curve is simply an extension above 700 second-feet and discharge values above that point should be used with caution. Discharge Dec. 4, 1909, to Mar. 9, 1910, Dec. 4, 1910, to Apr. 10, 1911, Dec. 4 to 9 and 19 to 26, 1911, and Dec. 30, 1911, to Apr. 17, 1912, estimated, because of ice, from discharge measurements, gage heights, gage observer's notes, climatologic records, and discharge of adjacent drainage areas:

Period.	Mean discharge (second-feet).		Period.	Mean discharge (second-feet).	
	Estimate.	Range.		Estimate.	Range.
Dec. 4–31, 1909	270	150–400	Apr., 1–10, 1911	700	....
Jan., 1910	200	70–500	Dec. 4–9, 1911	400	250–600
Feb., 1910	450	150–900	Dec. 19–26, 1911	440	200–700
Mar. 1–9, 1910	800	700–1,000	Jan., 1912	400	....
Dec. 4–31, 1910	80	20–200	Feb., 1912	220	....
Jan., 1911	100	....	Mar., 1912	650	....
Feb., 1911	40	....	Apr. 1–17, 1912	600	500–700
Mar., 1911	120	....			

Discharge Dec. 28, 1912, interpolated.

Monthly discharge of Union River at Amherst, Maine, for 1909–1912.

[Drainage area, 140 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1909.						
August	36	15	21.5	0.154	0.18	D.
September	2,110	14	145	1.04	1.16	D.
October	1,150	156	373	2.66	3.07	C.
November	913	182	325	2.32	2.59	C.
December	628	....	299	2.14	2.47	D.
1910.						
January	....	....	200	1.43	1.65	D.
February	....	....	450	3.21	3.34	D.
March	....	321	563	4.02	4.64	C.
April	966	284	570	4.07	4.54	B.
May	753	128	312	2.23	2.57	C.
June	187	103	145	1.04	1.16	C.
July	175	38	75.0	.536	.62	B.
August	222	34	87.4	.624	.72	B.
September	55	23	37.7	.269	.30	C.
October	57	22	33.0	.236	.27	C.
November	80	39	55.3	.395	.44	C.
December	....	....	79.5	.568	.65	D.
The year	....	....	216	1.54	20.90	
1911.						
January	....	....	100	0.714	0.82	D.
February	....	....	40	.286	.30	D.
March	....	....	120	.857	.99	D.
April	....	....	904	6.46	7.21	C.
May	869	173	357	2.55	2.94	B.
June	369	83	175	1.25	1.40	B.
July	96	37	55.2	.394	.45	B.
August	143	39	68.1	.486	.56	B.
September	72	40	58.2	.416	.46	A.
October	83	27	46.2	.330	.38	A.
November	319	31	130	.929	1.04	A.
December	....	....	404	2.89	3.33	C.
The year	....	....	205	1.46	19.88	
1912.						
January	....	....	400	2.86	3.30	D.
February	....	....	220	1.57	1.69	D.
March	....	....	650	4.64	5.35	D.
April	1,680	....	867	6.19	6.91	B.
May	862	304	478	3.41	3.93	A.
June	1,070	100	448	3.20	3.57	B.
July	119	35	64.7	.462	.53	A.
August	126	21	78.0	.557	.64	B.
September	96	14	68.2	.487	.54	A.
October	651	72	200	1.43	1.65	B.
November	948	282	535	3.82	4.26	A.
December	876	226	466	3.33	3.84	B.
The year	1,680	14	373	2.06	36.21	

NOTE.—See footnotes to tables of daily discharge.

GREEN LAKE AT GREENLAKE, MAINE.

Location.—At highway bridge at head of lake, 600 feet from Greenlake railroad station.

Records available.—July 1, 1909, to December 31, 1912.

Area of lake surface.—4.43 square miles.

Gage.—Staff nailed to log abutment of highway bridge. Record shows the fluctuation of the lake level.

Cooperation.—The cooperative observer is Mr. H. F. Lord, of Greenlake, Maine.

Daily gage height, in feet, of Green Lake at Greenlake, Maine, for 1912.

[H. F. Lord, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	......	8.3	8.2	8.3	6.9	6.3	5.5	3.6	3.9	6.0
2	......	......	......	8.3	8.2	8.3	6.8	6.35	5.5	3.5	3.9	6.1
3	......	......	5.85	8.3	8.1	8.2	6.8	6.3	5.5	3.5	4.0	6.1
4	......	......	......	8.3	8.1	8.1	6.7	6.3	5.5	3.5	4.0	6.2
5	......	......	......	8.3	8.0	8.1	6.7	6.3	5.4	3.4	4.05	6.2
6	......	......	......	8.3	8.0	8.0	6.7	6.3	5.4	3.4	4.1	6.2
7	......	......	......	8.3	7.9	7.9	6.6	6.3	5.4	3.2	4.1	6.25
8	......	......	......	8.3	7.9	7.9	6.6	6.25	5.4	3.2	4.2	6.3
9	......	......	......	8.3	7.9	7.9	6.6	6.25	5.4	3.2	4.5	6.3
10	......	......	6.15	8.3	7.8	7.9	6.5	6.2	5.4	3.1	4.7	6.3
11	......	......	......	8.2	7.8	7.9	6.5	6.2	5.3	3.0	4.8	6.35
12	5.15	......	......	8.2	7.8	7.8	6.5	6.2	5.3	2.95	4.9	6.35
13	......	......	......	8.2	7.8	7.8	6.4	6.1	5.3	2.9	5.0	6.4
14	......	......	......	8.1	7.9	7.7	6.4	6.1	5.2	2.9	5.1	6.4
15	......	......	......	8.1	7.9	7.7	6.4	6.1	5.1	2.8	5.2	6.5
16	......	......	......	8.2	7.9	7.7	6.4	6.1	5.0	2.8	5.3	6.6
17	......	......	......	8.2	7.9	7.7	6.3	6.0	4.9	2.8	5.3	6.6
18	......	......	7.95	8.2	7.9	7.7	6.3	6.0	4.8	2.7	5.35	6.6
19	......	......	......	8.3	7.9	7.6	6.3	5.9	4.7	2.7	5.4	6.6
20	......	......	......	8.4	7.9	7.6	6.3	5.9	4.6	2.6	5.4	6.6
21	......	......	......	8.4	7.9	7.5	6.4	5.9	4.5	2.6	5.45	6.7
22	......	......	8.25	8.45	7.9	7.5	6.4	5.8	4.4	2.6	5.5	6.7
23	......	......	......	8.4	7.8	7.4	6.4	5.8	4.3	2.5	5.5	6.7
24	......	......	......	8.45	7.8	7.3	6.4	5.8	4.3	2.5	5.6	6.7
25	......	......	......	8.45	7.8	7.3	6.4	5.8	4.2	3.2	5.65	6.8
26	......	......	......	8.45	7.8	7.2	6.4	5.7	4.1	3.4	5.7	6.9
27	......	......	......	8.45	7.8	7.1	6.4	5.7	4.0	3.6	5.75	6.9
28	......	......	......	8.45	7.9	7.0	6.3	5.7	3.9	3.7	5.8	7.0
29	......	......	......	8.4	7.9	7.0	6.3	5.6	3.8	3.75	5.9	7.0
30	......	......	......	8.3	8.0	7.0	6.3	5.6	3.7	3.75	5.9	7.0
31	......	......	......	......	8.2	......	6.3	5.6	......	3.8	......	7.1

NOTE.—Observer reports as follows: "Apr. 23: Ice left the lake. Dec. 24: Lake closed."

GREEN LAKE STREAM AT LAKEWOOD, MAINE.

Location.—At highway bridge half a mile below dam at outlet of Green Lake, half a mile from Lakewood post office, and 8 miles from Ellsworth.

Records available.—July 1, 1909, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—47 square miles.

Gage.—Seven-foot staff, nailed to right-hand abutment, upstream side of bridge.

Channel.—Practically permanent; banks not subject to overflow.

Discharge measurements.—Made from lower side of bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge every year at this station.

Artificial control.—The dam half a mile above the station at the outlet of the lake controls the storage of the lake, and records do not show the natural flow.

The following discharge measurement was made by F. E. Pressey:

March 22: Gage height, 3.60 feet; discharge, 206 second-feet. Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Green Lake Stream at Lakewood, Maine, for 1912.

[Martin A. Garland, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	2.6	2.70	3.72	3.55	3.50	2.90	2.80	2.78	3.20	2.60	2.48
2	......	......	2.70	3.72	3.50	3.50	2.90	2.80	2.78	3.20	2.60	2.48
3	......	......	2.70	3.72	3.40	3.50	2.90	2.80	2.78	3.20	2.60	2.48
4	......	......	2.70	3.72	3.35	3.50	2.90	2.80	2.78	3.20	2.40	2.50
5	......	......	2.70	3.72	3.30	3.50	2.90	2.80	2.78	3.20	2.40	2.50
6	......	2.70	2.70	3.72	3.28	3.50	2.90	2.80	2.78	3.20	2.40	2.50
7	......	2.70	2.70	3.68	3.25	3.50	2.90	2.80	2.78	3.20	2.40	2.50
8	......	2.70	2.70	3.60	3.22	3.50	2.90	2.80	2.78	3.20	2.40	2.50
9	......	2.70	2.70	3.55	3.20	3.45	2.90	2.80	2.78	3.20	2.40	2.50
10	......	2.70	2.70	3.50	3.20	3.40	2.90	2.80	2.78	2.90	2.40	2.50
11	......	2.70	2.70	3.50	3.20	3.38	2.88	2.80	3.20	2.90	2.40	2.52
12	......	2.70	2.88	3.50	3.20	3.35	2.85	2.80	3.20	2.90	2.40	2.55
13	......	2.70	2.80	3.50	3.20	3.30	2.85	2.80	3.20	2.70	2.40	2.58
14	......	2.70	2.80	3.50	3.20	3.25	2.82	2.80	3.20	2.70	2.40	2.60
15	......	2.70	2.90	3.48	3.20	3.20	2.80	2.78	3.20	2.70	2.40	2.70
16	......	2.70	3.00	3.48	3.20	3.15	2.78	2.78	3.20	2.70	2.40	2.80
17	......	2.70	3.20	3.45	3.20	3.10	2.75	2.78	3.20	2.70	2.40	2.80
18	......	2.70	......	3.42	3.20	3.10	2.75	2.78	3.20	2.70	2.42	2.80
19	2.6	2.70	......	3.40	3.20	3.10	2.72	2.80	3.20	2.70	2.45	2.85
20	......	2.70	......	3.60	3.20	3.10	2.70	2.80	3.20	2.70	2.45	2.85
21	......	2.70	......	3.60	3.20	3.00	2.70	2.80	3.20	2.70	2.45	2.85
22	......	2.70	3.60	3.60	3.20	3.00	2.72	2.80	3.20	2.70	2.45	2.85
23	......	2.70	3.60	3.80	3.20	3.00	2.75	2.80	3.20	2.70	2.45	2.85
24	2.6	2.70	3.60	3.80	3.18	2.98	2.78	2.80	3.20	2.70	2.45	2.85
25	......	2.70	3.60	3.78	3.18	2.98	2.78	2.80	3.20	2.75	2.45	2.85
26	......	2.70	3.60	3.75	3.18	2.95	2.78	2.80	3.20	2.80	2.45	2.85
27	......	2.70	3.60	3.70	3.18	2.92	2.78	2.80	3.20	2.80	2.45	2.85
28	......	2.70	3.60	3.65	3.18	2.90	2.78	2.78	3.20	2.60	2.45	2.85
29	......	2.70	3.70	3.60	3.18	2.90	2.78	2.78	3.20	2.60	2.45	2.85
30	......	......	3.72	3.55	3.30	2.90	2.78	2.78	3.20	2.60	2.45	2.85
31	......	......	3.72	......	3.50	......	2.78	2.78	......	2.60	......	2.85

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 17. Observer noted conditions as follows: Apr. 20 and Sept. 11, gates partly open at outlet; Oct. 10 and 13, gates closed at outlet; Oct. 28, gates tightly closed; Nov. 4, gates tightly closed, flow simply leakage through dam.

Daily discharge, in second-feet, of Green Lake Stream at Lakewood, Maine, for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	268	248	77	62	59	146	38	26
2	......	248	248	77	62	59	146	38	26
3	......	211	248	77	62	59	146	38	26
4	......	194	248	77	62	59	146	19	28
5	......	177	248	77	62	59	146	19	28
6	......	171	248	77	62	59	146	19	28
7	......	162	248	77	62	59	146	19	28
8	......	152	248	77	62	59	146	19	28
9	......	146	230	77	62	59	146	19	28
10	......	146	211	77	62	59	77	19	28
11	......	146	204	74	62	146	77	19	30
12	......	146	194	70	62	146	77	19	33
13	......	146	177	70	62	146	49	19	36
14	......	146	162	65	62	146	49	19	38
15	......	146	146	62	59	146	49	19	49
16	......	146	132	59	59	146	49	19	62
17	......	146	119	56	59	146	49	19	62
18	......	146	119	56	59	146	49	21	62
19	211	146	119	52	62	146	49	24	70
20	288	146	119	49	62	146	49	24	70
21	288	146	96	49	62	146	49	24	70
22	288	146	96	52	62	146	49	24	70
23	376	146	96	56	62	146	49	24	70
24	376	141	92	59	62	146	49	24	70
25	367	141	92	59	62	146	56	24	70

Daily discharge, in second-feet, of Green Lake Stream at Lakewood, Maine, for 1912—Con.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	354	141	86	59	62	146	62	24	70
27	331	141	81	59	62	146	62	24	70
28	310	141	77	59	59	146	38	24	70
29	288	141	77	59	59	146	38	24	70
30	268	177	77	59	59	146	38	24	70
31	....	248	....	59	59	....	38	....	70

NOTE.—Daily discharge computed from a rating curve fairly well defined above 20 second-feet.

Discharge Jan. 1 to Apr. 18, estimated, because of ice, from one discharge measurement, gage heights, observer's notes, and climatologic records:

Period.	Estimated discharge (second-feet).	
	Mean.	Range.
January	20	10–35
February	30	25–40
March	120	35–250
April 1–18	230	200–250

Monthly discharge of Green Lake Stream at Lakewood, Maine.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	20	0.426	0.49	
February	....	....	30	.638	.69	
March	....	....	120	2.55	2.94	D.
April	376	....	263	5.60	6.25	C.
May	268	141	163	3.47	4.00	B.
June	248	77	160	3.40	3.79	B.
July	77	49	64.9	1.38	1.59	B.
August	62	59	61.2	1.30	1.50	B.
September	146	59	117	2.49	2.78	B.
October	146	38	79.5	1.69	1.95	B.
November	38	[a] 19	23.0	.489	.55	C.
December	70	26	50.2	1.07	1.23	C.
The year	376	....	95.8	2.04	27.76	

[a] Flow, simply leakage through dam.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

BRANCH LAKE NEAR ELLSWORTH, MAINE.

Location.—Near the intake to the wheels of the Branch Pond Lumber Co.'s mill, at the lower end of Branch Lake, in Ellsworth, Maine.

Records available.—June 29, 1909, to December 31, 1912.

Area of lake surface.—4.33 square miles.

Gage.—Staff; datum unchanged. Readings indicate height of lake.

Altitude.—Altitude as determined by Geological Survey, 236 feet above sea level, and this height was assumed as the height of the water surface at the time of the Union River surface reconnaissance.[1] In accordance with this assumption, the top of the mill-pond dam at the lower end of the lake is 240 feet above sea level.

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[1] U. S. Geol. Survey Water-Supply Paper 281, p. 57, 1912.

Daily gage height, in feet, of Branch Lake near Ellsworth, Maine, for 1912.

[L. H. Cushman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.00				9.25				6.10			6.80
2					9.18	8.85						
3	4.00		4.70								6.00	
4								6.90				
5		4.45			9.12							
6				7.90			7.55			5.10		
7							7.50					
8							7.45		5.95			7.10
9						8.40						
10			4.70				7.3				6.65	
11	4.20	4.40						6.70				
12					9.20	8.20					6.70	
13					9.12	8.25			5.80	5.00		
14	4.20			8.25			7.25					
15	4.20								5.70			7.10
16				8.32		8.15						
17	4.30		6.40	8.38	9.08			6.60			6.65	
18		4.30		8.40			7.1					
19					9.00				5.50			
20					8.88	8.05				4.70		
21	4.45			8.70	8.80		7.05			4.60		
22				8.85	8.70				5.50			7.30
23					8.65	8.00						
24	4.55										6.70	
25		4.60	7.15					6.40				
26					8.55							
27									5.35	5.80		
28	4.50			9.28			7.05					
29									5.25			7.40
30			7.50		8.58	7.80		6.15		5.85		
31												

NOTE.—Observer reported the following: May 20: Took off planks in waste gate, 6 feet 6 inches by 14 inches; June 20: Planks put back in waste gate at noon; July 6: Removed planks in waste gate at noon, 6 feet 6 inches by 18 inches; July 10: Planks returned to gate.

BRANCH LAKE STREAM NEAR ELLSWORTH, MAINE.

Location.—At small highway bridge immediately below the sawmill at outlet of Branch Lake, 5 miles from Ellsworth.

Records available.—July 1, 1909, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—31 square miles.

Gage.—Seven-foot staff nailed to right abutment downstream side of bridge. Lake levels are taken on 8½-foot staff nailed to corner of mill near intake of wheel.

Channel.—Gravelly and permanent in natural condition; fills up with sawmill waste, but generally clears itself during spring freshets.

Discharge measurements.—Made from highway bridge.

Winter flow.—Relation between gage height and discharge affected by ice.

Artificial control.—The flow from the lake is regulated in the interest of the sawmill and power plants of Ellsworth.

Accuracy.—Estimates of discharge for 1912 are withheld because of uncertainty of the discharge rating curve after about May 15.

The following discharge measurement was made by F. E. Pressey:

March 22, 1912: Gage height, 4.50 feet; discharge, 64 second-feet.

Daily gage height, in feet, of Branch Lake Stream at Ellsworth, Maine, for 1912.

[L. H. Cushman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.20				4.42				4.15			4.20
2					4.42	4.70						
3	4.20		4.20								4.15	
4								4.20				
5		4.15			4.25							
6				4.30			4.38			4.20		
7							4.60					
8							4.60		4.15			4.20
9						4.70						
10			4.17				4.38				4.20	
11	4.20	4.15						4.25				
12					4.20	4.50						
13					4.45				4.32	4.15		
14	4.20			4.25			4.15				4.70	
15	4.15		4.20						4.58		4.70	4.20
16				4.20		4.25						
17	4.30		4.40	4.20	4.70			4.30			4.25	
18		4.10		4.18			4.15					
19					4.70				4.48			
20					4.70	4.20				4.45		
21	4.20			4.20	4.70		4.15			4.35		
22			4.50	4.20	4.70				4.20			4.15
23					4.70	4.15						
24	4.20										4.25	
25		4.15	4.45					43.0				
26					4.60							
27									4.25	4.42		
28	4.15			4.30			4.15					
29		4.40							4.20			4.15
30					4.62	4.15		4.25		4.30		
31												

NOTE.—Observer noted the following: Nov. 14 and 15, sawing all day—9 hours. Dec. 22 and 29, stream clear of ice except edges.

PENOBSCOT RIVER BASIN.

WEST BRANCH OF PENOBSCOT RIVER AT MILLINOCKET, MAINE.

Location.—Quakish Lake dam and the Millinocket mill of the Great Northern Paper Co. at Millinocket, Maine.

Records available.—January 11, 1901, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,880 square miles.

Gage.—Automatic recording gage at Quakish Lake dam and gages in the forebay and tail races at the mill.

Channel.—Crest of concrete dam.

Determination of discharge.—The flow is computed by considering the flow over the dam, the flow through the wheels, and the water used from time to time through the log sluices, filters, etc. The wheels were rated at Holyoke, Mass., before being placed in position. As the head under which they work, averaging about 110 feet, is much greater than the head under which they were tested, numerous tube-float measurements of flow in the channel leading to the mill have been made by engineers of the company, in order to determine just how much water the mill used under different conditions of gate opening. In addition to this, a series of current-meter measurements were made by the United States Geological Survey to check the float measurements. It is believed that by means of the various checks on measurements, the estimates of discharge through the wheels are excellent. When the flow of the river is less than 2,500 second-feet, all of the water generally flows through the wheels of the mill.

Winter flow.—No difficulty is experienced in the winter on account of ice affecting the estimates of discharge or the running of the wheels. Ferguson Pond, just above the entrance to the canal, eliminates effect from anchor ice.

Artificial control.—Storage dams at the outlet of North Twin Lake and at the outlet of Chesuncook Lake store water on a surface of about 65 square miles with a capacity of about 32,000,000,000 cubic feet. Except during the time (usually in August) when excess water has to be supplied for log driving on the river below Millinocket and for a short time during the spring freshet, run-off is regulated by storage.

Cooperation.—Results obtained and computations made by engineers of the Great Northern Paper Co., who furnish these data to the Survey. For 1912 the company has preferred to furnish values of monthly discharge only.

Monthly discharge of West Branch of Penobscot River at Millinocket, Maine, for 1912.

[Drainage area, 1,880 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).
	Mean.	Per square mile.			Mean.	Per square mile.	
January	2,060	1.10	1.27	August	2,390	1.27	1.46
February	2,040	1.09	1.18	September	2,210	1.18	1.32
March	2,030	1.08	1.24	October	2,240	1.19	1.37
April	2,300	1.22	1.36	November	6,340	3.37	3.76
May	6,630	3.53	4.07	December	3,270	1.74	2.01
June	7,510	4.00	4.46				
July	3,400	1.81	2.09	The year	3,520	1.88	25.59

PENOBSCOT RIVER AT WEST ENFIELD, MAINE.

Location.—At the steel highway bridge 1 mile below the village of West Enfield, Maine; 1,000 feet below the mouth of Piscataquis River.

Records available.—January 1, 1902, to December 31, 1912. Data also in annual reports of the Maine State Water Storage Commission.

Drainage area.—6,600 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Practically permanent; broken by four bridge piers; banks high and rocky and not subject to overflow.

Winter flow.—Affected by ice.

Artificial control.—Flow of the river since about 1900 largely controlled by storage, principally in the lakes tributary to the West Branch. About 1 mile above the station is the dam of the International Paper Co., and the Piscataquis is dammed near its entrance into the Penobscot. Considerable water is held above these two dams at night. At low stages daily fluctuations in gage heights are caused by variations in wheel gate openings.

Accuracy.—Conditions favor the accurate determination of discharge.

Cooperation.—Many of the discharge measurements are made by the students of the University of Maine under the direction of Prof. H. S. Boardman.

Discharge measurements of Penobscot River at West Enfield, Maine, in 1912.

[Made by students of University of Maine under direction of Prof. H. S. Boardman.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-feet.*		*Feet.*	*Sec.-feet.*
Sept. 28	3.20	6,050	Oct. 19	3.49	6,580
Sept. 28	3.20	6,040	Oct. 23	3.60	6,820
Oct. 5	4.18	8,540	Oct. 23	3.60	7,150
Oct. 19	3.49	6,460			

Daily gage height, in feet, of Penobscot River at West Enfield, Maine, for 1912.

[A. H. Hanson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.2			8.8	10.7	13.3	4.5	3.05	4.8	3.8	7.65	5.5
2	4.95		5.65		10.3	13.55	4.45	3.3	4.7	3.9	7.2	5.35
3	5.05	5.45		8.9	9.6	13.3	4.35	3.9	4.55	4.05	7.05	5.75
4	5.0		5.2		8.95	12.95	4.05	4.05	4.25	4.15	6.9	5.75
5	5.2	5.35		8.6	8.55	12.2	3.4	3.9	4.05	4.2	7.2	6.15
6	5.55				7.85	11.45	3.7	3.9	3.45	3.9	7.1	6.4
7	5.95		5.35	8.6	7.75	10.4	3.85	3.7	3.65	3.65	7.2	6.2
8	6.35	5.25		8.95	7.7	10.3	3.95	3.3	3.5	3.8	9.2	6.65
9	6.1		5.3	9.4	7.5	8.7	4.0	3.2	3.3	3.65	14.65	5.95
10	5.95			10.5	7.85	7.55	4.0	3.45	3.2	3.6	12.9	5.4
11	5.95		5.05	10.25	8.2	7.25	4.0	4.55	3.25	3.5	11.8	5.65
12	5.85	4.95		9.65	8.4	7.1	4.1	6.0	3.1	3.35	11.05	5.4
13	5.7			8.55	8.8	7.35	4.0	7.4	2.8	3.2	10.7	4.9
14		5.2	5.5	8.0	9.05	7.55	3.75	7.3	2.75	3.15	10.6	4.25
15	6.15			7.9	9.55	7.55	3.75	7.1	2.7	3.7	9.75	4.6
16			6.9	8.35	9.25	7.45	4.15	7.15	2.35	3.65	9.0	4.75
17	6.1	5.2	8.0	9.85	9.05	7.35	4.1	6.9	3.55	3.4	8.8	4.9
18			8.4	11.1	9.35	7.05	4.0	6.35	3.35	3.25	8.35	4.8
19	5.95	4.6		11.4	9.2	6.9	3.8	5.85	3.25	3.4	8.1	4.6
20			9.0	11.45	8.7	6.65	3.65	5.5	3.45	3.25	7.7	4.95
21		4.85		11.35	8.2	6.6	3.6	5.15	3.7	3.3	7.4	5.55
22	5.4			11.45	7.6	6.4	3.65	4.8	3.8	3.55	7.15	5.3
23			8.8	12.15	7.75	6.25	4.4	4.45	3.65	3.7	6.9	5.15
24	5.3	5.45		14.05	7.95	5.55	4.6	4.6	3.85	3.7	6.75	4.45
25			7.9	13.4	8.25	5.6	4.15	4.75	3.6	6.5	6.7	4.75
26	5.85	5.5		12.55	8.1	5.5	3.95	5.1	3.35	11.5	6.5	3.9
27				12.15	7.95	5.45	3.75	5.0	3.15	12.55	6.5	3.65
28		5.45		11.75	7.8	5.55	3.55	4.9	3.15	10.75	6.15	4.1
29	5.4		7.65	11.35	8.0	5.3	3.05	4.9	2.95	9.7	5.9	4.2
30				10.55	8.25	4.9	2.95	5.1	2.9	8.75	5.75	4.0
31	5.6		8.7		11.85		3.0	4.95		8.1		3.5

NOTE.—Observer reported the following conditions: Apr. 10, ice went out; June 3, logs running thick in river; July 13, river full of logs; July 20, river clear of logs.

Daily discharge, in second-feet, of Penobscot River at West Enfield, Maine, for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		38,000	54,400	9,420	5,540	10,300	7,440	21,300	12,600
2		35,600	56,000	9,270	6,140	10,000	7,710	19,300	12,100
3		31,600	54,400	8,980	7,710	9,570	8,120	18,600	13,500
4		27,900	52,100	8,120	8,120	8,680	8,400	18,000	13,500
5		25,700	47,300	6,390	7,710	8,120	8,540	19,300	15,000
6		22,200	42,600	7,170	7,710	6,520	7,710	18,800	16,000
7		21,800	36,200	7,580	7,170	7,040	7,040	19,300	15,200
8		21,500	35,600	7,840	6,140	6,650	7,440	29,300	17,000
9		20,600	26,500	7,980	5,890	6,140	7,040	63,200	14,300
10		22,200	20,800	7,980	6,520	5,890	6,910	51,800	12,300
11	35,400	23,900	19,500	7,980	9,570	6,020	6,650	44,800	13,200
12	31,800	25,000	18,800	8,260	14,400	5,650	6,260	40,200	12,300
13	25,700	27,100	19,900	7,980	20,200	4,960	5,890	38,000	10,700
14	23,000	28,500	20,800	7,300	19,700	4,840	5,770	37,400	8,680
15	22,500	31,200	20,800	7,300	18,800	4,730	7,170	32,400	9,720
16	24,700	29,600	20,400	8,400	19,100	3,950	7,040	28,200	10,200
17	33.000	28,500	19,900	8,260	18,000	6,780	6,390	27,100	10,700
18	40,500	30,100	18,600	7,980	15,800	6,260	6,020	24,700	10,300
19	42,300	29,300	18,000	7,440	13,900	6,020	6,390	23,400	9,720
20	42,600	26,500	17,000	7,040	12,600	6,520	6,020	21,500	10,800
21	42,000	23,900	16,800	6,910	11,500	7,170	6,140	20,200	12,800
22	42,600	21,100	16,000	7,040	10,300	7,440	6,780	19,100	12,000
23	47,000	21,800	15,400	9,120	9,270	7,040	7,170	18,000	11,500
24	59,200	22,700	12,800	9,720	9,720	7,580	7,170	17,400	9,270
25	55,000	24,200	13,000	8,400	10,200	6,910	16,400	17,200	10,200
26	49,500	23,400	12,600	7,840	11,300	6,260	43,000	16,400	7,710
27	47,000	22,700	12,500	7,300	11,000	5,770	49,500	16,400	7,040
28	44,500	22,000	12,800	6,780	10,700	5,770	38,400	15,000	8,260
29	42,000	23,000	12,000	5,540	10,700	5,300	32,100	14,100	8,540
30	37,260	24,200	10,700	5,300	11,300	5,190	26,800	13,500	7,960
31		45,100		5,420	10,800		23,400		6,650

NOTE.—Daily discharge computed from a well-defined rating curve.

Discharge Jan. 1 to Apr. 10, estimated, because of ice, from gage heights, climatologic records, and discharge of adjacent drainage areas: January, 8,400 second-feet; February, 6,800 second-feet; March, 12,000 second-feet; Apr. 1-10, 20,000 second-feet.

Monthly discharge of Penobscot River at West Enfield, Maine, for 1912.

[Drainage area, 6,600 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			8,400	1.27	1.46	D.
February			6,800	1.03	1.11	D.
March			12,000	1.82	2.10	D.
April	59,200		32,900	4.98	5.56	C.
May	45,100	20,600	26,500	4.02	4.64	A.
June	56,000	10,700	25,100	3.80	4.24	B.
July	9,720	5,300	7,680	1.16	1.34	B.
August	20,200	5,540	11,200	1.70	1.96	A.
September	10,300	3,950	6,640	1.01	1.13	A.
October	49,500	5,770	12,800	1.94	2.24	A.
November	63,200	13,500	25,500	3.86	4.31	A.
December	17,000	6,650	11,300	1.71	1.97	B.
The year	63,200		15,500	2.35	32.06	

NOTE.—See footnotes to table of daily discharge.

EAST BRANCH OF PENOBSCOT RIVER AT GRAND LAKE DAM, MAINE.

Location.—At the dam at the outlet of Grand Lake, T. 6, Rs. 8 and 9, about 47 miles above the mouth of the river.

Records available.—April 18 to July 12, 1912. Records simply show fluctuation of the level of the lake.

Drainage area.—496 square miles. Includes Chamberlain Lake drainage area, 270 square miles.

Gage.—Staff gage at the dam.

Channel.—The dam at the outlet of Grand Lake is a timber crib about 185 feet long between ledge abutments and affords a head of 14 feet. There are five gates 8 feet wide and one sluice gate 17 feet wide. The elevation of gate sills is about 641.2 feet.

Discharge measurements.—None made at this station.

Artificial control.—The dam at this station, as well as the one at the outlet of Chamberlain Lake, is operated in the interests of log driving. The gates are generally closed down in the spring as soon as the ice goes out, and the spring freshet flow is thus stored. The gates are subsequently manipulated when running logs, and at the end of the drive are left open for the balance of the season. During the fall of the year the flow from Grand Lake and the lower course of the East Branch is generally the natural flow.

Cooperation.—Records are furnished by Mr. George H. Hamlin, of Orono, through the office of the Maine State Water Storage Commission.

Daily gage height, in feet, of East Branch of Penobscot River at Grand Lake dam, Maine, for 1912.

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1		13.5	15.5	13.1	11		13.0	14.1	9.75	21	10.75	13.50	14.0	
2		12.85	15.75	12.9	12		13.25	14.1	9.5	22	11.25	13.50	14.0	
3		12.35	15.9	12.65	13		13.5	14.5		23	11.5	13.65	14.0	
4		12.4	15.4	12.4	14		13.75	14.65		24	12.0	13.75	13.9	
5		12.75	14.9	12.15	15		14.0	14.85		25	12.5	13.9	13.9	
6		13.15	14.5	11.85	16		13.75	14.6		26	12.65	14.0	13.85	
7		13.35	14.35	11.15	17		13.75	14.35		27	12.6	14.15	13.85	
8		13.15	14.35	10.75	18	8.5	13.75	14.25		28	12.5	14.35	13.65	
9		13.0	14.25	10.35	19	9.75	13.75	14.15		29	13.1	14.50	13.5	
10		12.85	14.15	10.0	20	10.25	13.50	14.1		30	13.35	15.0	13.25	
										31		15.25		

EAST BRANCH OF PENOBSCOT RIVER AT GRINDSTONE, MAINE.

Location.—Bangor & Aroostook Railroad bridge half a mile south of railroad station at Grindstone, one-eighth mile above Grindstone Falls, and about 8 miles above the mouth at Medway.

Records available.—October 23, 1902, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,100 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Practically permanent; stream confined by abutments of bridge and broken by one pier at ordinary stages; velocity of current medium at moderate and high stages, but sluggish at low water.

Discharge measurements.—Made from railroad bridge.

Winter flow.—Affected by ice.

Artificial control.—Several dams are maintained at the outlets of a number of lakes and ponds near the source of the river and regulated in the interests of log driving. During the summer and fall gates are generally left open. The basin of the East Branch since about 1840 includes about 270 square miles of additional territory draining into Chamberlain Lake that formerly drained into the St. John River basin. This diversion is made through what is known as the Telso canal.

Accuracy.—The relation between gage height and discharge is materially affected by backwater from log jams that form at the station and at Grindstone Falls immediately below and during the winter months by ice. Results believed to be fair for moderate and high stages, but uncertain for low water.

The following discharge measurement was made by F. E. Pressey:

March 7, 1912: Gage height, 5.64 feet; discharge, 375 second-feet. Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of East Branch of Penobscot River at Grindstone, Maine, for 1912.

[Geo. H. Goddard, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	5.50	......	......	9.25	10.05	7.08	5.58	6.68	5.55	7.40	6.10
2	6.80	......	......	......	8.98	9.75	7.00	5.90	6.58	5.68	7.62	6.10
3	6.70	......	6.10	6.80	8.68	9.30	6.90	6.22	6.48	5.80	8.10	6.48
4	......	5.40	......	......	8.22	9.20	6.75	6.20	6.35	5.78	7.65	6.62
5	......	......	......	......	7.50	8.95	6.60	5.95	6.12	5.68	7.52	6.35
6	......	......	......	......	7.25	8.72	6.68	5.38	5.98	5.62	7.40	6.20
7	6.40	......	5.60	7.00	7.75	8.52	6.90	4.88	5.80	5.55	7.65	6.55
8	......	5.40	......	......	7.60	8.40	6.95	4.78	5.65	5.50	8.95	6.48
9	......	......	......	......	7.90	8.25	6.80	5.25	5.52	5.38	10.55	6.18
10	6.20	......	5.60	6.90	8.00	8.10	6.65	6.52	5.40	5.40	9.40	5.90
11	......	5.30	......	......	7.50	8.10	6.35	7.05	5.32	5.40	8.35	5.98
12	......	......	......	......	7.05	8.00	6.15	7.55	5.30	5.28	8.08	6.00
13	6.00	......	......	......	7.00	8.00	5.80	7.3	5.22	5.35	7.92	5.90
14	......	......	5.90	6.80	7.70	8.15	5.50	6.95	5.15	5.50	7.88	5.90
15	......	5.25	......	......	8.00	8.10	5.35	7.20	4.95	5.50	7.52	5.80
16	......	......	......	......	7.95	7.85	5.40	7.28	5.00	5.48	7.40	5.85
17	6.10	......	7.00	8.20	7.80	7.80	5.30	6.88	5.00	5.42	7.40	6.00
18	......	5.20	......	9.20	7.75	7.80	5.30	6.50	5.05	5.38	7.25	5.90
19	......	......	......	8.70	7.65	7.70	5.52	6.08	5.10	5.30	6.95	6.10
20	......	......	7.20	8.45	7.60	7.55	6.00	6.00	5.20	5.38	6.80	6.30
21	6.00	......	......	8.42	7.45	7.30	5.80	5.98	5.62	5.40	6.80	6.20
22	......	5.70	......	8.50	7.32	7.20	5.60	5.90	5.62	5.28	6.80	6.00
23	......	......	......	9.18	7.35	7.10	5.75	5.85	5.58	5.22	6.75	5.90
24	5.80	......	7.20	10.75	7.50	7.00	5.72	5.85	5.45	5.38	6.70	5.90
25	......	6.10	......	10.30	7.50	7.10	5.65	5.80	5.35	8.80	6.62	5.80
26	......	......	......	9.70	7.50	7.10	5.50	5.78	5.30	11.45	6.60	5.80
27	......	......	6.10	9.75	7.50	7.10	5.42	5.60	5.28	10.80	6.48	5.80
28	5.70	......	......	10.00	7.40	7.10	5.38	5.58	5.22	9.10	6.25	5.90
29	......	6.10	......	9.50	8.35	7.10	5.35	6.20	5.20	8.05	6.20	5.90
30	......	......	......	9.45	9.45	7.10	5.30	6.80	5.32	7.55	6.12	5.90
31	......	......	6.90	......	10.05	......	5.42	6.82	......	7.38	......	5.90

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 18; average thickness of ice from 0.7 to 2.1 feet. Gage observer reported anchor ice in river on Dec. 10; river partly frozen over Dec. 21 and river frozen over Dec. 30. Relation of gage height to discharge may have been affected by ice during these periods in December, but effect is not considered sufficient to warrant correction.

Daily discharge, in second-feet, of East Branch of Penobscot River at Grindstone, Maine, for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		8,170	10,100	3,470	1,110	2,760	1,080	4,090	1,810
2		7,530	9,380	3,320	1.520	2,590	1,230	4,530	1,810
3		6,840	8,290	3,140	1,990	2,420	1,380	5,550	2,420
4		5,810	8,050	2,880	1,960	2,200	1,350	4,600	2,650
5		4,290	7,460	2,620	1,590	1,840	1,230	4,330	2,200
6		3,800	6,940	2,760	902	1,630	1,150	4,090	1,960
7		4,800	6,480	3,140	549	1,380	1,080	4,600	2,540
8		4,490	6,210	3,230	495	1,190	1,020	7,460	2,420
9		5,120	5,880	2,960	790	1,040	902	11,400	1,930
10		5,330	5,550	2,700	2,480	920	920	8,530	1,520
11		4,290	5,550	2,200	3,420	848	920	6,100	1,630
12		3,420	5,330	1,880	4,390	830	814	5,510	1,660
13		3,320	5,330	1,380	3,890	766	875	5,160	1,520
14		4,700	5,660	1,020	3,230	715	1,020	5,080	1.520
15		5,330	5,550	875	3,700	590	1,020	4,330	1,380
16		5,220	5.020	920	3,850	620	1,000	4,090	1,450
17		4,910	4,910	830	3,100	620	940	4,090	1,660
18		4,800	4,910	830	2,450	650	902	3,800	1,520
19	6,890	4,600	4,700	1,040	1,780	680	830	3,230	1,810
20	6,320	4,490	4,390	1,660	1,660	750	902	2,960	2,120
21	6,250	4,190	3,890	1,380	1,630	1,150	920	2,960	1,960
22	6,430	3,930	3,700	1,130	1,520	1,150	814	2,960	1,660
23	8,000	3,990	3,510	1,320	1,450	1,110	766	2,880	1,520
24	11,900	4,290	3,320	1,280	1,450	970	902	2,790	1,520
25	10,800	4,290	3,510	1,190	1,380	875	7,120	2,650	1,380
26	9,250	4,290	3,510	1,020	1,350	830	13,800	2,620	1,380
27	9,380	4,290	3,510	940	1,130	814	12,000	2,420	1,380
28	10,000	4,090	3,510	902	1,110	766	7,810	2,040	1,520
29	8,770	6,100	3,510	875	1,960	750	5,440	1,960	1,520
30	8,650	8,650	3,510	830	2,960	848	4,390	1,840	1,520
31		10,100		940	3,000		4,050		1,520

NOTE.—Daily discharge computed from a rating curve fairly well defined between 400 and 10,000 second-feet. Discharge Jan. 1 to Apr. 18 estimated, because of ice, from one discharge measurement, gage heights, observer's notes, and climatologic records: January, 750 second-feet; February, 480 second-feet; March, 1,000 second-feet, varying from about 350 to 1,800 second-feet; Apr. 1-18, 2,800 second-feet, varying from about 2,000 to 6,000 second-feet. See footnotes to table of daily gage heights relative to possible ice effect during December.

Monthly discharge of East Branch of Penobscot River at Grindstone, Maine, for 1912.

[Drainage area, 1,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			750	0.682	0.79	D.
February			480	.436	.47	D.
March			1,000	.909	1.05	C.
April	11,900		5,100	4.64	5.18	C.
May	10,100	3,320	5,140	4.67	5.38	A.
June	10,100	3,320	5,370	4.88	5.44	A.
July	3,470	830	1,760	1.60	1.84	A.
August	4,390	495	2,060	1.87	2.16	A.
September	2,760	590	1,140	1.04	1.16	A.
October	13,800	766	2,530	2.30	2.65	A.
November	11,400	1,840	4,290	3.90	4.35	B.
December	2,650	1,380	1,760	1.60	1.84	B.
The year	13,800		2,610	2.37	32.31	

NOTE.—See footnotes to table of daily discharge.

MATTAWAMKEAG RIVER AT MATTAWAMKEAG, MAINE.

Location.—At Maine Central Railroad bridge at the village of Mattawamkeag, half a mile above the mouth of the river.

Records available.—August 26, 1902, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,500 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Practically permanent; broken by two bridge piers.

Discharge measurements.—Made from the bridge, which is slightly oblique to the current; low-water measurements made by wading at a point about 1 mile above the station.

Winter flow.—Affected by ice.

Artificial control.—Dams are maintained at the outlets of several large lakes and ponds, but the stored water is used only for log driving.

Accuracy.—Relation between gage height and discharge is at times affected by backwater from log jams that form during short periods in the log-driving season, and, during the winter months, by ice. A very good open-channel discharge rating curve has been developed.

Discharge measurements of Mattawamkeag River at Mattawamkeag, Maine, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 4-5	F. E. Pressey	7.30	[a] 806
Nov. 2	do	6.88	4,900

[a] Measurement made under ice cover.

Daily gage height, in feet, of Mattawamkeag River at Mattawamkeag, Maine, for 1912.

[W. T. Mincher, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.1	......	......	......	8.8	10.15	5.4	4.3	5.15	4.75	7.45	5.8
2	7.35	......	......	......	8.55	10.75	5.2	4.55	5.0	5.05	7.15	5.7
3	7.65	......	7.1	......	8.3	12.15	5.0	4.6	4.9	5.35	6.8	5.6
4	7.8	8.1	7.3	......	8.2	12.15	4.7	4.7	4.8	5.4	6.9	5.95
5	7.7	......	7.3	......	8.05	11.85	4.5	5.35	4.7	5.5	7.0	6.3
6	7.7	......	......	......	7.8	10.35	4.4	5.15	4.6	5.4	6.9	6.3
7	......	......	......	9.4	7.55	9.45	4.35	5.0	4.5	5.3	6.8	6.3
8	......	......	......	......	7.15	8.65	4.2	4.8	4.4	5.05	8.35	6.3
9	......	......	......	......	7.1	7.0	4.05	4.9	4.3	5.0	10.3	6.2
10	......	......	7.0	......	7.45	6.85	3.9	5.0	4.3	4.9	10.75	6.1
11	......	8.0	......	8.5	7.7	6.6	3.65	5.8	4.3	4.95	10.45	6.1
12	......	......	......	8.05	7.7	6.7	3.4	6.15	4.3	5.15	10.4	6.0
13	......	......	......	7.9	7.6	6.7	3.3	7.1	4.2	5.15	9.9	6.0
14	6.0	......	......	8.0	7.5	6.9	3.3	7.75	4.1	5.0	9.4	5.9
15	......	......	......	8.2	7.5	7.0	3.3	8.05	4.0	5.0	8.95	5.9
16	......	......	......	8.45	7.4	7.1	3.2	7.85	4.25	4.9	8.65	5.8
17	......	......	8.3	9.0	7.4	7.1	3.2	7.65	4.5	4.9	8.35	5.7
18	......	6.6	......	9.4	7.5	7.0	3.4	7.35	4.6	5.0	8.05	5.6
19	......	......	......	9.6	7.25	7.0	3.8	7.1	4.7	5.15	7.75	5.5
20	......	......	......	9.6	7.0	6.8	3.8	6.7	4.7	5.1	7.7	5.4
21	8.6	......	......	9.7	6.75	6.7	3.65	6.2	4.7	5.1	7.7	5.4
22	......	......	......	9.8	6.55	6.6	3.4	5.9	4.7	5.1	7.6	5.4
23	......	......	......	9.7	6.3	6.4	3.4	5.75	4.7	5.1	7.45	5.4
24	......	......	8.7	9.65	6.5	6.2	3.3	5.7	4.8	5.15	7.15	5.3
25	......	......	......	9.45	6.7	6.0	3.85	5.8	4.8	6.0	6.75	5.3
26	......	6.5	......	9.4	6.6	5.9	4.45	6.05	4.7	7.05	6.6	5.3
27	......	......	......	9.3	6.45	5.8	4.4	6.1	4.6	7.75	6.4	5.3
28	8.2	......	......	9.1	6.4	5.7	4.3	6.0	4.5	8.25	6.3	5.3
29	......	......	......	9.1	6.65	5.6	4.2	5.9	4.55	8.05	6.2	......
30	......	......	......	9.0	8.2	5.5	4.1	5.7	4.6	7.85	5.95	......
31	......	......	9.7	......	9.75	......	4.0	5.45	......	7.65	......	......

Note.—Relation of gage height to discharge affected by ice about Jan. 1 to Apr. 11, and about Dec. 26 to 31.

Daily discharge, in second-feet, of Mattawamkeag River at Mattawamkeag, Maine, for 1912.

Day.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,280		9,420	13,200	2,200	906	1,880	1,380	6,030	2,820
2			8,770	15,000	1,950	1,160	1,690	1,760	5,380	2,660
3			8,120	19,500	1,690	1,210	1,560	2,150	4,680	2,500
4			7,860	19,500	1,320	1,320	1,440	2,220	4,880	3,070
5			7,480	18,500	1,100	2,150	1,320	2,360	5,080	3,710
6			6,850	13,800	1,000	1,880	1,210	2,220	4,880	3,710
7			6,250	11,200	953	1,690	1,100	2,080	4,680	3,710
8			5,380	9,030	818	1,440	1,000	1,760	8,250	3,710
9			5,280	5,080	698	1,560	906	1,690	13,600	3,520
10			6,030	4,780	590	1,690	906	1,560	15,000	3,340
11			6,600	4,280	445	2,820	906	1,620	14,100	3,340
12		7,480	6,600	4,480	334	3,430	906	1,880	13,900	3,160
13		7,100	6,360	4,480	295	5,280	818	1,880	12,400	3,160
14		7,350	6,140	4,880	295	6,720	736	1,690	11,000	2,980
15		7,860	6,140	5,080	295	7,480	660	1,690	9,820	2,980
16		8,510	5,920	5,280	258	6,980	862	1,560	9,030	2,820
17		9,960	5,920	5,280	258	6,480	1,100	1,560	8,250	2,660
18		11,000	6,140	5,080	334	5,810	1,210	1,690	7,480	2,500
19		11,600	5,600	5,080	525	5,280	1,320	1,880	6,720	2,360
20		11,600	5,080	4,680	525	4,480	1,320	1,820	6,600	2,220
21		11,900	4,580	4,480	445	3,520	1,320	1,820	6,600	2,220
22		12,200	4,180	4,280	334	2,980	1,320	1,820	6,360	2,220
23		11,900	3,710	3,900	334	2,740	1,320	1,820	6,030	2,220
24		11,700	4,090	3,520	295	2,660	1,440	1,880	5,380	2,080
25		11,200	4,480	3,160	558	2,820	1,440	3,160	4,580	2,080
26		11,000	4,280	2,980	1,050	3,250	1,320	5,180	4,280	
27		10,800	4,000	2,820	1,000	3,340	1,210	6,720	3,900	
28		10,200	3,900	2,660	906	3,160	1,100	7,990	3,710	
29		10,200	4,380	2,500	818	2,980	1,160	7,480	3,520	
30		9,960	7,860	2,360	736	2,660	1,210	6,980	3,070	
31			12,000		660	2,290		6,480		

NOTE.—Daily discharge computed from a well-defined rating curve.

Discharge Jan. 2 to Apr. 11 and Dec. 26–31 estimated, because of ice, from one discharge measurement, gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas: Jan. 2–31, 2,000 second-feet; February, 1,400 second-feet; March, 2,300 second-feet, varying from about 750 to 4,500 second-feet; Apr. 1–11, 5,000 second-feet, varying from about 4,500 to 6,500 second-feet; Dec. 26–31, 1,700 second-feet.

Monthly discharge of Mattawamkeag River at Mattawamkeag, Maine, for 1912.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			2,110	1.41	1.63	D.
February			1,400	.933	1.01	D.
March			2,300	1.53	1.76	D.
April	12,200		8,280	5.52	6.16	C.
May	12,000	3,710	6,110	4.07	4.69	A.
June	19,500	2,360	7,030	4.69	5.23	B.
July	2,200	258	743	.495	.57	B.
August	7,480	906	3,300	2.20	2.54	A.
September	1,880	660	1,190	.793	.88	A.
October	7,990	1,380	2,830	1.89	2.18	A.
November	15,000	3,070	7,310	4.87	5.43	A.
December	3,710		2,640	1.76	2.03	C.
The year	19,500		3,760	2.51	34.11	

NOTE.—See footnotes to table of daily discharge.

PISCATAQUIS RIVER NEAR FOXCROFT, MAINE.

Location.—At Low's highway bridge, about halfway between Guilford and Foxcroft, three-fourths of a mile above the mouth of Black Stream and 3 miles below Mill Stream.

Records available.—August 17, 1902, to December 31, 1912. Data also in annual report of the Maine State Water Storage Commission.

Drainage area.—286 square miles.

Gage.—Staff, attached to left abutment of bridge; datum unchanged.

Channel.—Practically permanent; banks high and overflowed only during extreme floods.

Discharge measurements.—At medium and high stages made from the bridge; at low stages made by wading either above or below the bridge, where the bed is of fine gravel but the velocity is greater than at the bridge.

Winter flow.—Affected by ice during some years.

Artificial control.—The stream is used to develop power at several manufacturing plants above the station.

Accuracy.—The relation between gage height and discharge at low stages is considerably affected by the irregular use of the water at the mills; during some winters it is also affected by ice; little if any affected by backwater from log jams, as little log driving is now done on the river. A very good rating curve has been developed for medium stages, but the curve for high and low stages is not yet accurately defined.

Discharge measurements of Piscataquis River near Foxcroft, Maine, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Mar. 19	F. E. Pressey	5.20	[a] 965
Nov. 5	.....do	3.40	729

[a] Under ice cover.

Daily gage height, in feet, of Piscataquis River near Foxcroft, Maine, for 1912.

[A. F. D. Harlow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.7	3.5	4.05	4.85	5.0	6.05	2.4	2.9	2.2	2.55	3.8	3.1
2	5.4	3.5	4.05	4.1	5.0	5.2	2.35	3.5	2.2	2.7	4.2	3.3
3	5.1	3.45	4.1	4.05	4.9	4.8	2.35	3.4	2.2	2.7	4.0	3.3
4	4.8	3.3	4.15	4.1	4.5	4.4	2.25	3.15	2.2	2.7	3.65	3.3
5	4.7	3.35	4.2	4.1	4.3	4.3	2.25	3.05	2.2	2.55	3.5	3.3
6	4.4	3.5	4.25	4.1	4.55	4.2	2.0	2.95	2.2	2.55	3.4	3.35
7	4.1	3.85	4.25	3.7	4.45	4.05	2.0	2.75	2.2	2.5	3.5	3.5
8	4.0	3.85	4.15	4.8	4.45	4.05	2.0	2.6	2.15	2.5	7.6	3.35
9	4.3	3.85	3.9	4.55	4.4	3.6	2.0	2.5	2.15	2.3	6.4	3.4
10	4.25	3.85	3.8	4.45	4.05	3.6	2.1	2.35	2.15	2.2	5.1	3.4
11	4.2	3.85	3.9	4.7	3.8	3.5	2.1	2.5	2.15	2.2	4.5	3.3
12	4.2	3.85	3.9	4.7	3.8	3.4	2.1	3.6	2.1	2.25	4.4	3.3
13	4.05	3.85	4.3	4.7	4.2	3.15	2.2	3.9	2.1	2.3	4.35	3.3
14	3.8	3.85	4.8	4.65	4.75	3.1	2.2	3.5	2.1	2.35	4.05	3.3
15	4.0	3.5	5.15	4.75	4.75	2.95	2.2	3.2	2.1	2.4	3.9	2.85
16	4.2	3.5	5.2	5.85	4.7	2.8	2.0	3.1	2.1	2.35	3.8	2.8
17	4.2	3.5	5.5	6.7	4.7	2.8	2.0	2.9	1.95	2.25	3.5	2.85
18	4.1	3.35	5.4	6.9	4.7	2.8	2.2	2.5	1.95	2.2	3.4	2.85
19	3.9	3.35	5.15	6.6	4.5	2.8	2.45	2.65	1.95	2.2	3.2	3.0
20	3.9	3.45	5.15	6.05	4.4	2.8	2.25	2.65	2.55	2.2	3.2	3.2
21	3.6	3.7	4.95	5.8	4.15	2.7	1.9	2.65	3.1	2.2	3.1	3.15
22	3.8	3.6	4.8	5.85	4.15	2.7	2.5	2.65	2.95	2.25	3.1	3.2
23	3.8	4.25	4.4	9.1	4.15	2.5	2.6	2.65	2.9	2.45	3.15	3.15
24	3.75	4.5	4.2	7.6	4.4	2.45	2.6	2.65	2.65	3.05	3.15	3.0
25	3.7	4.35	4.1	6.35	4.7	2.45	2.6	2.5	2.6	7.25	3.15	2.9
26	3.7	4.35	4.2	6.15	4.7	2.5	2.6	2.65	2.4	8.05	3.15	2.75
27	3.7	4.35	3.9	6.25	4.35	2.5	2.5	2.7	2.25	6.5	3.15	2.75
28	3.6	4.3	3.7	5.5	3.9	2.5	2.25	2.5	2.1	5.3	3.15	2.75
29	3.4	4.2	3.75	5.35	3.8	2.45	2.25	2.5	2.05	4.25	3.15	2.65
30	3.25	......	4.7	5.1	5.6	2.4	2.4	2.2	2.35	4.0	3.15	2.6
31	3.25	......	4.8	......	6.8	......	2.55	2.2	......	4.0	......	2.6

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 18. Observer notes Apr. 28, logs began to run at noon.

Daily discharge, in second-feet, of Piscataquis River near Foxcroft, Maine, for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2,350	4,060	148	374	100	199	1,020	502
2		2,350	2,640	135	782	100	267	1,400	638
3		2,220	2,080	135	709	100	267	1,210	638
4		1,720	1,620	111	536	100	267	898	638
5		1,510	1,510	111	470	100	199	782	638
6		1,780	1,400	64	405	100	199	709	674
7		1,670	1,260	64	292	100	180	782	782
8		1,670	1,260	64	220	90	180	7,010	674
9		1,620	858	64	180	90	123	4,700	709
10		1,260	858	81	135	90	100	2,490	709
11		1,020	782	81	180	90	100	1,720	638
12		1,020	709	81	858	81	111	1,620	638
13		1,400	536	100	1,110	81	123	1,560	638
14		2,020	502	100	782	81	135	1,260	638
15		2,020	405	100	569	81	148	1,110	345
16		1,960	318	64	502	81	135	1,020	318
17		1,960	318	64	374	58	111	782	345
18		1,960	318	100	180	58	100	709	345
19	5,080	1,720	318	163	243	58	100	569	437
20	4,060	1,620	318	111	243	199	100	569	569
21	3,610	1,350	267	51	243	502	100	502	536
22	3,700	1,350	267	180	243	405	111	502	569
23	10,100	1,350	180	220	243	374	163	536	536
24	7,010	1,620	163	220	243	243	470	536	437
25	4,610	1,960	163	220	180	220	6,330	536	374
26	4,240	1,960	180	220	243	148	7,910	536	292
27	4,430	1,560	180	180	267	111	4,890	536	292
28	3,100	1,110	180	111	180	81	2,780	536	292
29	2,860	1,020	163	111	180	72	1,460	536	243
30	2,490	3,260	148	148	100	135	1,210	536	220
31		5,460		199	100		1,210		220

Note.—Daily discharge computed from a rating curve well defined between 20 and 4,000 second-feet, above which point the curve is simply an extension. Discharge Jan. 1 to Apr. 18 estimated, because of ice, from one discharge measurement, daily gage heights, climatologic records, and discharge of adjacent drainage areas: January, 450 second-feet; February, 320 second-feet; March, 650 second-feet; Apr. 1–18, 1,300 second-feet.

Monthly discharge of Piscataquis River near Foxcroft, Maine, for 1912.

[Drainage area, 286 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			450	1.57	1.81	D.
February			320	1.12	1.21	D.
March			650	2.27	2.62	D.
April	10,100		2,620	9.16	10.22	D.
May	5,460	1,020	1,830	6.40	7.38	B.
June	4,060	148	799	2.79	3.11	A.
July	220	51	123	.430	.50	B.
August	1,110	100	366	1.28	1.48	A.
September	502	58	138	.483	.54	B.
October	7,910	100	961	3.36	3.87	B.
November	7,010	502	1,240	4.34	4.84	B.
December	782	220	501	1.75	2.02	B.
The year	10,100		832	2.91	39.60	

Note.—See footnotes to table of daily discharge.

KENDUSKEAG STREAM NEAR BANGOR, MAINE.

Location.—At highway bridge at Sixmile Falls, about 6 miles northwest of Bangor.

Records available.—September 15, 1908, to December 31, 1912. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—191 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Practically permanent; broken by one pier; banks high and not subject to overflow.

Discharge measurements.—Made from the bridge.

Winter flow.—Affected by ice.

Artificial control.—A number of years ago an artificial cut was made for log driving through a low divide between Souadabscook Stream and Black Stream, the latter a tributary to the Kenduskeag, entering about 7 miles above the gaging station. During high stages of the Souadabscook a portion of its waters finds its way through the artificial cut into the Kenduskeag; at low stages of the Souadabscook all the flow continues down its own channel. Black Stream probably sends its waters only to the Kenduskeag.

Accuracy.—A good discharge rating curve has been developed, although more measurements are needed at high stages.

Discharge measurements of Kenduskeag Stream near Bangor, Maine, in 1912.

[Hydrographer, F. E. Pressey.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-feet.*
Mar. 11	3.54	[a] 82
June 1	7.01	2,560
Sept. 4	1.80	44

[a] Measurement made under ice cover.

Daily gage height, in feet, of Kenduskeag Stream near Bangor, Maine, for 1912.

[Fred Cort, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				6.3	3.9	7.0	1.8	2.2	2.05	2.3	4.5	3.6
2				6.05	3.6	6.7	1.8	2.25	2.0	2.3	4.4	3.7
3			4.0	5.6	3.3	6.3	1.9	2.25	2.0	2.3	4.5	3.85
4		3.2		5.3	3.0	5.6	2.0	2.3	1.9	2.45	4.4	4.3
5				4.85	3.05	4.7	1.95	2.25	1.9	2.65	4.4	4.5
6				4.55	3.15	3.9	1.9	2.25	1.8	2.85	4.3	4.4
7	4.0			5.25	3.0	3.45	1.95	2.2	1.9	3.0	4.45	4.55
8				6.3	3.0	3.4	1.95	2.3	1.9	2.75	5.25	4.45
9				6.55	3.4	3.2	1.85	2.15	2.0	2.55	6.5	4.55
10			3.6	6.25	3.25	3.05	1.9	2.05	2.0	2.35	6.2	4.25
11		2.6	3.5	5.8	3.75	3.0	1.9	2.0	2.0	2.3	5.05	4.1
12				5.65	3.65	2.9	1.9	2.15	2.1	2.3	4.7	3.9
13				5.45	3.45	2.85	1.9	2.25	2.0	2.3	4.95	3.8
14	3.5			5.5	3.85	2.95	1.85	2.25	2.05	2.4	4.9	3.7
15				5.55	3.85	2.75	1.9	2.2	2.15	2.5	4.7	3.75
16				5.9	3.85	2.7	1.8	2.1	2.35	2.6	4.6	3.65
17				6.3	3.7	2.9	1.75	2.1	2.5	2.5	4.5	3.7
18		3.0		6.2	3.7	2.65	1.7	2.1	2.35	2.45	4.55	3.7
19				6.55	3.65	2.5	1.8	2.0	2.3	2.4	4.45	3.65
20				6.75	3.2	2.35	1.85	2.0	2.3	2.3	4.3	3.55
21	3.5			6.05	2.95	2.55	1.9	2.1	2.25	2.4	4.0	3.4
22				5.5	3.2	2.45	2.05	2.2	2.2	2.45	4.1	3.5
23				5.55	3.25	2.5	2.15	2.35	2.2	2.4	3.95	3.45
24				6.1	3.35	2.55	2.15	2.45	2.25	3.5	3.85	3.55
25		4.5		5.7	3.4	2.45	2.15	2.5	2.15	5.65	3.7	3.6
26				5.5	3.3	2.3	2.05	2.45	2.1	7.25	3.65	3.65
27				4.9	3.1	2.25	2.0	2.45	2.05	7.2	3.45	3.7
28	3.5			4.4	2.95	2.05	1.9	2.4	2.2	6.25	3.6	3.65
29				4.0	3.05	1.95	1.9	2.25	2.25	5.25	3.55	3.7
30				3.8	4.3	1.9	2.0	2.15	2.2	4.3	3.6	3.75
31					6.15		2.15	2.05		4.5		4.4

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to Apr. 15; average thickness of ice from 1 to 1½ feet.

Daily discharge, in second-feet, of Kenduskeag Stream near Bangor, Maine, for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	576	2,600	45	102	78	119	845	465
2	....	465	2,340	45	110	71	119	795	501
3	....	366	2,020	57	110	71	119	845	557
4	....	276	1,500	71	119	57	146	795	745
5	....	290	950	64	110	57	188	795	845
6	....	320	576	57	110	45	236	745	795
7	....	276	414	64	102	57	276	820	870
8	....	276	398	64	119	57	211	1,270	820
9	....	398	335	51	94	71	166	2,180	870
10	....	350	290	57	78	71	128	1,940	722
11	....	520	276	57	71	71	119	1,150	655
12	....	483	249	57	94	86	119	950	576
13	....	414	236	57	110	71	119	1,090	538
14	....	557	262	51	110	78	137	1,060	501
15	....	557	211	57	102	94	156	950	520
16	1,720	557	199	45	86	128	177	895	483
17	2,020	501	249	40	86	156	156	845	501
18	1,940	501	188	34	86	128	146	870	501
19	2,220	483	156	45	71	119	137	820	483
20	2,390	335	128	51	71	119	119	745	448
21	1,830	262	166	57	86	110	137	615	398
22	1,440	335	146	78	102	102	146	655	431
23	1,470	350	156	94	128	102	137	596	414
24	1,860	382	166	94	146	110	431	557	448
25	1,580	398	146	94	156	94	1,540	501	465
26	1,440	366	119	78	146	86	2,820	483	483
27	1,060	305	110	71	146	78	2,780	414	501
28	795	262	78	57	137	102	1,980	465	483
29	615	290	64	57	110	110	1,270	448	501
30	538	745	57	71	94	102	745	465	520
31	....	1,900	....	94	78	....	845	....	795

NOTE.—Daily discharge computed from a rating curve well defined between 10 and 300 second-feet, and fairly well defined throughout the remainder of the range of stage during 1912.

Discharge Jan. 1 to Apr. 15 estimated, because of ice, from one discharge measurement, gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas: January, 250 second-feet; February, 150 second-feet; March, 400 second-feet, varying from about 80 to 1,000 second-feet; Apr. 1-15, 1,000 second-feet, varying from about 700 to 1,500 second-feet.

Monthly discharge of Kenduskeag Stream near Bangor, Maine, for 1912.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	250	1.31	1.51	D.
February	....	....	150	.785	.85	D.
March	....	....	400	2.09	2.41	D.
April	2,390	....	1,260	6.60	7.36	C.
May	1,900	262	455	2.38	2.74	B.
June	2,600	57	493	2.58	2.88	B.
July	94	34	61.7	.323	.37	B.
August	156	71	105	.550	.63	A.
September	156	45	89.4	.468	.52	A.
October	2,820	119	514	2.69	3.10	B.
November	2,180	414	853	4.47	4.99	B.
December	870	398	575	3.01	3.47	B.
The year	2,820	....	433	2.27	30.83	

NOTE.—See footnotes to table of daily discharge.

KENNEBEC RIVER BASIN.

MOOSE RIVER NEAR ROCKWOOD, MAINE.

Location.—At a deserted cabin one-fourth mile above the house of Edilbert Arsenault, 2 miles above the mouth of the river; reached by steamer or rowboat from Kineo.

Records available.—September 7, 1902, to December 31, 1908; May 16, 1910, to September 18, 1912. Data in annual reports of Maine State Water Storage Commission.

Drainage area.—680 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from a car suspended from a steel cable or, at low stages, by wading at a section a short distance downstream.

Winter flow.—Affected by ice.

Artificial control.—Dams are maintained at the outlets of several of the lakes above the station, but all such stored water is used for log driving and the effect on the regimen of flow is but temporary.

Accuracy.—The relation between gage height and discharge is at times affected by backwater from log jams, and during the winter by ice; otherwise conditions favor accurate determination of discharge, and a good discharge rating curve has been developed except for extremely low stages.

Daily gage height, in feet, of Moose River near Rockwood, Maine, for 1912.

[Edilbert Arsenault, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.9	2.6	2.3	3.55	8.15	6.6	5.25	2.0	2.9
2	3.9	2.5	2.2	3.6	8.35	6.6	5.0	2.0	2.9
3	3.9	2.4	2.2	3.4	8.4	6.5	4.65	2.0	2.9
4	3.8	2.4	2.2	3.4	8.55	6.5	4.45	2.0	2.85
5	3.8	2.4	2.1	3.4	8.2	6.55	4.1	2.25	2.8
6	3.7	2.6	2.1	3.3	7.95	6.55	3.8	2.35	2.7
7	3.7	2.7	2.1	3.3	7.65	6.4	3.5	2.4	2.85
8	3.7	2.85	2.0	3.3	7.3	6.4	3.4	2.55	2.7
9	3.7	3.25	2.0	3.3	7.3	6.4	3.3	2.6	2.6
10	3.7	3.3	2.0	3.3	7.0	6.25	3.25	2.7	2.5
11	3.8	3.3	2.0	3.2	7.05	6.15	3.2	2.8	2.45
12	4.0	3.2	2.0	3.25	6.9	6.1	3.2	2.95	2.4
13	4.0	3.2	2.1	3.45	6.7	6.0	3.1	3.1	2.3
14	3.9	3.1	2.2	3.65	6.6	5.9	2.95	3.2	2.3
15	3.8	3.05	2.2	4.0	6.6	5.7	2.85	3.35	2.2
16	3.7	2.9	2.2	4.05	6.4	5.55	2.7	3.45	2.2
17	3.6	2.9	2.2	4.3	6.4	5.4	2.6	3.6	2.3
18	3.5	2.8	2.2	4.85	6.35	5.4	2.5	3.6	2.3
19	3.4	2.8	2.3	5.15	6.35	5.4	2.4	3.5	....
20	3.3	2.8	2.3	5.5	6.2	5.4	2.3	3.4	....
21	3.25	2.7	2.4	5.9	6.1	5.5	2.3	3.3	....
22	3.2	2.7	2.5	6.15	6.0	5.35	2.2	3.3	....
23	3.2	2.6	2.5	6.5	6.0	5.5	2.15	3.2	....
24	3.2	2.65	2.6	6.9	5.9	5.5	2.05	3.2	....
25	3.2	2.7	2.7	7.05	5.8	5.4	2.0	3.1	....
26	3.2	2.7	2.7	7.15	5.65	5.4	2.0	3.1	....
27	3.2	2.6	2.7	7.3	5.8	5.35	2.0	3.0	....
28	3.2	2.5	3.1	7.45	5.95	5.3	2.0	3.0	....
29	2.95	2.4	3.65	7.65	6.05	5.4	1.9	3.0	....
30	2.8	....	3.85	8.0	6.15	5.4	1.95	2.9	....
31	2.65	....	3.9	....	6.5	....	2.0	2.9	....

NOTE.—Relation of gage height to discharge affected by ice about Jan. 7 to Feb. 22. Gage heights during March probably not materially affected by ice. Observer noted: Jan. 12 and Feb. 9, frozen across at gage section; Feb. 21, opened; May 6, logs commenced running in river, no jam to date.

Daily discharge, in second-feet, of Moose River near Rockwood, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,170	....	338	937	5,460	3,670	2,290	238	584
2	1,170	....	303	968	5,700	3,670	2,060	238	584
3	1,170	....	303	846	5,760	3,560	1,750	238	584
4	1,100	....	303	846	5,940	3,560	1,580	238	562
5	1,100	....	270	846	5,520	3,620	1,310	320	539
6	1,030	....	270	788	5,220	3,620	1,100	356	496
7	....	....	270	788	4,860	3,460	906	375	562
8	....	....	238	788	4,460	3,460	846	434	496
9	....	....	238	788	4,460	3,460	788	454	454
10	....	....	238	788	4,110	3,300	760	496	414
11	....	....	238	733	4,170	3,190	733	539	394
12	....	....	238	760	4,000	3,140	733	608	375
13	....	....	270	876	3,780	3,040	681	681	338
14	....	....	303	1,000	3,670	2,930	608	733	338
15	....	....	303	1,240	3,670	2,730	562	817	303
16	....	....	303	1,270	3,460	2,580	496	876	303
17	....	....	303	1,460	3,460	2,430	454	968	338
18	....	....	303	1,920	3,400	2,430	414	968	338
19	....	....	338	2,190	3,400	2,430	375	906	....
20	....	....	338	2,530	3,240	2,430	338	846	....
21	....	....	375	2,930	3,140	2,530	338	788	....
22	....	....	414	3,190	3,040	2,380	303	788	....
23	....	454	414	3,560	3,040	2,530	286	733	....
24	....	475	454	4,000	2,930	2,530	254	733	....
25	....	496	496	4,170	2,830	2,430	238	681	....
26	....	496	496	4,280	2,680	2,430	238	681	....
27	....	454	496	4,460	2,830	2,380	238	631	....
28	....	414	681	4,630	2,980	2,340	238	631	....
29	....	375	1,000	4,860	3,090	2,430	207	631	....
30	....	....	1,130	5,280	3,190	2,430	222	584	....
31	....	....	1,170	....	3,560	....	238	584	....

NOTE.—Discharge Jan. 7 to Feb. 22 estimated, because of ice, from climatologic records, gage observer's notes, and discharge of adjacent areas: Jan. 7–31, 430 second-feet, varying from about 250 to 900 second-feet; Feb. 1–22, 320 second-feet, varying from about 300 to 400 second-feet.

Monthly discharge of Moose River near Rockwood, Maine, for 1912.

[Drainage area, 680 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,170	....	564	0.829	0.96	D.
February	496	....	352	.518	.56	D.
March	1,170	238	414	.609	.70	C.
April	5,280	733	2,120	3.12	3.48	C.
May	5,940	2,680	3,900	5.74	6.62	B.
June	3,670	2,340	2,900	4.26	4.75	B.
July	2,290	207	696	1.02	1.18	A.
August	968	238	606	.891	1.03	A.
September 1–18	584	303	445	.654	.44	B.

MOOSEHEAD LAKE AT EAST OUTLET, MAINE.

Location.—At the wharf at the east outlet of the lake, about 8 miles from Kineo.

Records available.—April 1, 1895, to December 31, 1912.

Drainage area.—1,240 square miles.

Gage.—Staff, at end of boat landing; two datums have been used at the east outlet; the original datum is at elevation 1,011.30 feet above mean sea level and approximately 10 feet below the sills of the outlet gates; gage is read to this datum; the second, to which all gage readings published to and including 1911 have been referred, is 10 feet higher; that is, the zero is at the sill of the gates. It is believed that low water may go below the sill of the gates (zero of second datum) and so gage heights in this report are published as read; that is, to the original datum 1,011.30 feet above mean sea level.

Artificial control.—The lake is regulated to a capacity of 23,735,000,000 cubic feet. The dam at the east outlet is controlled by 35 gates; 15 old gates are at gage height 10 feet (original datum) and 20 gates at sill-gate height 8 feet (original datum). At extreme low stages the flow from the lake is controlled not by the gates but by a bar above the dam at an approximate gage height of 9 feet (original datum). The records show only fluctuations in the level of the lake, and are used in the studies of regulation of the lake and in computing the natural flow of the Kennebec at The Forks station.

Storage capacity.—Approximately equal to a discharge of 124 second-feet for one month (30 days) for each tenth foot of depth over the surface of Moosehead Lake.

Cooperation.—Record kept and furnished for publication by the Hollingsworth & Whitney Co.

Daily gage height, in feet, of Moosehead Lake at east outlet, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13.9		13.4	13.4	17.2		17.3				15.35	
2		14.0						15.7	15.4	15.1		17.05
3	13.95			13.5	17.0	17.55	17.2					
4			13.3						15.4	15.15	15.55	16.95
5	14.2	14.0		13.5		17.5	17.2	15.6				
6			13.2		17.45						15.6	16.95
7		13.9				17.5		15.5	15.35	15.2		
8	14.3		13.15	13.6	17.45		17.05				16.0	
9		13.9						15.45	15.3	15.15		16.85
10	14.3			13.6	17.55		16.95					
11			13.05						15.25		16.2	17.0
12		13.8		13.85		17.5	16.85	15.5		15.2		
13			13.0		17.55				15.2		16.3	17.0
14		13.8				17.5		15.6		15.1		
15	14.15		13.1	13.95	17.6		16.6				16.6	
16		13.75				17.0		15.75	15.1	15.1		17.0
17	14.1			14.2	17.55		16.5				16.8	
18			13.2						15.1	15.05		17.0
19	14.1	13.6		14.5		17.5	16.3	15.7				
20			13.3		17.45				15.05		16.9	17.05
21		13.5				17.5	16.2	15.65		15.0		
22	14.1		13.3	15.0	17.45						17.0	
23		13.5						15.6	15.15	14.9		16.95
24	14.1			15.5	17.55	17.4	16.1					
25			13.3			17.35			15.15	15.0	17.1	16.85
26	14.1	13.4		16.05			15.9	15.6				
27			13.3		17.5				15.1		17.0	16.8
28		13.5				17.3		15.5		15.1		
29	14.1		13.35	16.85			15.8				17.05	
30								15.45	15.1	15.3		
31	14.1				17.6		15.7					16.8

NOTE.—Gage heights refer to original datum, elevation 1,011.30 feet above mean sea level. See "Gage" in description.

KENNEBEC RIVER AT THE FORKS, MAINE.

Location.—At wooden highway bridge across river about 2,000 feet above the mouth of Dead River.

Records available.—September 28, 1901, to December 31, 1912. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—1,570 square miles.

Gages.—Standard chain, attached to bridge, a staff gage attached to timber retaining wall on left bank 75 feet above the bridge, and an automatic gage installed June 21, 1912, on the left abutment. Datum of gages unchanged.

Channel.—Practically permanent; unbroken by piers.

Discharge measurements.—Made from the bridge.

Winter flow.—Affected by ice.

Artificial control.—The flow of the Kennebec above The Forks is controlled through Moosehead Lake (see p. 47); Indian Pond, about 12 miles above the station, is under regulation for log driving from about May 1 to July 31 of each year.

Accuracy.—The relation between gage height and discharge is affected by the regulation of the stream for log driving and for the extensive water-power plants below and, during the winter, by ice. The operation of the gates at Indian Pond Dam (from about May 1 to July 31 of each year) causes fluctuations in daily gage heights at The Forks ranging from 2 feet to more than 5 feet. A good rating curve has been developed for the station. The variations in gage heights have been closely noted, record being kept of the maximum and minimum heights for each day during the log-driving season, the length of time that the driving head continues, and the hours at which the gates at Indian Pond are opened and closed each day. Although set to the same datum in practically the same cross section, the automatic gage does not read the same as the chain gage above about 1.2 feet, as shown by the table of relation below. A careful determination of the cross section of the water surface at chain-gage height 5.5 feet clearly showed the transverse slope and checked the table of relation at that stage. It should be noted that the left abutment is on the concave side of a distinct bend in the river and that the chain gage is about 90 feet from the left abutment. A discharge rating curve referred to automatic gage heights was developed from the discharge rating curve referred to chain-gage heights by means of the table of gage relation. Discharge for each 4-hour period, June 21 to December 31, was computed from this rating curve and the daily discharge as published is the mean of the discharge for six periods and therefore more accurate than the discharge obtained by entering the rating table with the published mean daily gage height.

Discharge measurements of Kennebec River at The Forks, Me., in 1911–12.

[F. E. Pressey, hydrographer.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1911.	*Feet.*	*Sec.-ft.*	1911.	*Feet.*	*Sec.-ft.*	1911.	*Feet.*	*Sec.-ft.*
Aug. 19	5.39	6,800	Aug. 22	5.26	6,470	Aug. 23	4.82	5,440
19	5.32	6,570	22	5.19	6,290	23	3.94	3,950
19	5.20	6,340	22	4.84	5,580	Oct. 25	.50	298
21	5.35	6,610	22	[a] .64	282			
21	5.15	6,250	22	[a] .60	279	1912.		
21	4.54	4,960	23	5.22	6,230	Feb. 21 [b]	3.78	1,600
21	3.46	3,090	23	5.15	6,150			

[a] Backwater from Dead River probably affected gage height.
[b] Measurement made under complete ice cover.

NOTE.—The measurements for 1911 listed above were omitted from Water-Supply Paper 301.

Daily gage height, in feet, of Kennebec River at The Forks, Maine, for 1912.

[W. S. Young, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1					6.25	8.30	2.54	2.26	2.51	1.89	1.99	2.90
2			3.80		8.70	6.70		2.47	2.45	1.84	1.48	3.00
3		3.80			8.25	6.35		2.44	2.22	1.72		2.95
4					6.15	6.30		2.58	2.12	1.63	1.48	2.62
5					4.40	6.30		2.81	2.33	1.54	1.42	2.54
6				2.20	3.25	6.20		2.76	2.47	1.47	1.44	2.12
7					4.75	6.10		2.44	2.52	1.47	2.36	2.10
8					6.30	6.10		2.37	2.18	1.79	2.90	2.10
9			3.80		6.20	5.65	2.27	2.27	1.80	1.88	2.89	2.15
10		3.80			6.15	4.00	2.72	2.38	2.04	1.90	2.74	2.36
11					6.35	4.10	2.95	2.42	2.23	2.19	2.54	2.35
12					6.35	4.30	2.46	2.51	1.94	2.23	2.38	2.36
13	2.00			1.70	6.40	4.25	3.23	3.05	2.20	2.25	2.23	2.36
14					6.35	4.25	2.87	2.92	2.42	2.28	2.15	2.35
15					6.30	4.25	2.81	2.53	2.45	2.30	2.13	
16			3.60	2.10	6.30	4.20	2.79		2.50	2.28	1.97	2.37
17		3.80		3.50	6.35	4.10	2.46		2.48	2.22	1.74	2.37
18				3.75	6.30	3.50	2.45		2.24	2.20	1.52	2.38
19				4.15	6.20	3.60	2.76		2.30	2.32	1.50	2.40
20	2.30			3.95	6.25	3.45	2.44		2.60	2.40	1.50	2.39
21		3.78		3.75	6.15	3.28	2.48	2.24	2.74	2.40	1.55	2.39
22			3.20	4.15	5.65	3.59	2.74	3.00	2.62	2.41	2.10	
23				4.60	5.50	3.16	2.87	2.88	2.41	2.40	2.18	2.45
24		3.80		4.40	5.45	3.30	2.46	2.34	1.97	2.37	2.20	2.46
25				4.40	5.95	3.28	2.55	1.75	1.77	2.17	2.27	2.45
26				4.85	6.80	3.17	2.70	1.45	1.67	2.20	2.79	2.45
27	2.80			4.35	6.00	3.43		2.10	1.58	2.33	3.60	2.46
28				4.35	6.20	3.15	2.53	2.58	1.54	2.12	2.99	2.44
29				4.65	6.35	2.76	2.46	2.76	1.84	1.88	1.60	
30			2.90	4.40	6.70	2.92	2.27	2.47	2.08	1.70	1.69	2.43
31					8.30		2.45	2.54		1.58		2.45

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Apr. 15. Probably no material effect during December. Gates at Indian Pond were closed June 10. Gage heights June 10 to 20 are not true indices of discharge, owing to the effect of regulation for the purpose of log driving. Gage heights missing July 2 to 8, July 27, Aug. 16 to 20, Nov. 3, and Dec. 5, 22, and 29 because automatic gage did not work satisfactorily and no observations were made with chain gage. Gage heights Jan. 1 to June 9, from chain gage, and June 21 to Dec. 31, from automatic gage. See *Accuracy* in station description.

Relation of chain gage and automatic gage, Kennebec River at The Forks, Maine, 1912.

Chain gage.	Automatic gage.	Chain gage.	Automatic gage.	Chain gage.	Automatic gage.
Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
0.50	0.50	2.40	2.35	4.30	4.08
.60	.60	2.50	2.45	4.40	4.16
.70	.70	2.60	2.54	4.50	4.25
.80	.80	2.70	2.64	4.60	4.33
.90	.90	2.80	2.74	4.70	4.41
1.00	1.00	2.90	2.84	4.80	4.50
1.10	1.10	3.00	2.93	4.90	4.57
1.20	1.20	3.10	3.03	5.00	4.65
1.30	1.29	3.20	3.12	5.10	4.73
1.40	1.39	3.30	3.22	5.20	4.81
1.50	1.49	3.40	3.31	5.30	4.90
1.60	1.58	3.50	3.40	5.40	4.97
1.70	1.68	3.60	3.49	5.50	5.05
1.80	1.78	3.70	3.58	5.60	5.12
1.90	1.88	3.80	3.67	5.70	5.20
2.00	1.97	3.90	3.75	5.80	5.28
2.10	2.07	4.00	3.83	5.90	5.35
2.20	2.16	4.10	3.92		
2.30	2.25	4.20	4.00		

The above table is not applicable for ice or obstructed channel conditions. It is based on comparative readings made during 1912 and is well defined.

Daily discharge, in second-feet, of Kennebec River at The Forks, Maine, for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	8,520	13,400	2,580	2,060	1,960	1,260	1,350	2,420
2	....	14,400	9,520	3,180	2,470	1,860	1,210	909	2,540
3	....	13,200	8,740	3,140	2,360	1,620	1,110	910	2,480
4	....	8,300	8,630	3,090	2,490	1,520	1,030	909	2,060
5	....	4,690	8,630	3,040	2,960	1,750	952	861	1,960
6	....	2,800	8,410	2,990	2,840	1,900	901	877	1,480
7	....	5,360	8,190	2,940	2,400	1,970	896	1,740	1,460
8	....	8,630	8,190	2,900	2,290	1,580	1,160	2,420	1,460
9	....	8,410	7,220	2,120	2,050	1,200	1,250	2,400	1,510
10	....	8,300	3,820	2,800	2,210	1,420	1,270	2,210	1,740
11	....	8,740	3,100	3,170	2,370	1,610	1,560	1,960	1,730
12	....	8,740	3,410	2,470	2,510	1,300	1,600	1,770	1,740
13	....	8,850	3,320	3,520	3,380	1,570	1,620	1,600	1,740
14	....	8,740	3,320	3,000	2,450	1,810	1,650	1,510	1,730
15	....	8,630	3,320	2,930	2,040	1,850	1,680	1,490	1,740
16	1,430	8,630	3,250	2,970	1,970	1,910	1,650	1,330	1,760
17	3,170	8,740	3,100	2,500	1,900	1,890	1,590	1,120	1,760
18	3,560	8,630	2,420	2,520	1,830	1,610	1,570	941	1,770
19	4,240	8,410	2,520	2,900	1,760	1,680	1,700	925	1,790
20	3,900	8,520	2,380	2,470	1,680	2,040	1,780	925	1,780
21	3,560	8,300	3,390	2,490	1,610	2,220	1,800	965	1,780
22	4,240	7,220	3,840	2,870	2,600	2,060	1,810	1,400	1,820
23	5,070	6,900	3,510	3,100	2,410	1,800	1,790	1,540	1,850
24	4,690	6,800	3,780	2,460	1,730	1,330	1,760	1,560	1,860
25	4,690	7,860	3,630	2,580	1,130	1,150	1,530	1,640	1,850
26	5,560	9,750	3,250	2,710	886	1,060	1,570	2,270	1,850
27	4,600	7,970	3,900	2,640	1,470	985	1,710	3,500	1,860
28	4,600	8,410	3,550	2,570	2,030	953	1,480	2,530	1,840
29	5,170	8,740	2,920	2,440	2,270	1,210	1,250	1,000	1,830
30	4,690	9,520	3,170	2,100	1,890	1,440	1,090	1,060	1,830
31	....	13,400	....	2,420	1,990	....	986	....	1,850

NOTE.—Daily discharge determined from two well-defined discharge rating curves. (See *Accuracy* in station description.) The determinations for June 10 to 20 are approximate, however, as a result of possible errors in computed discharge caused by controlled flow for flushing logs down the river and backwater from log jams. The daily discharge for this period was computed by applying the rating table to the several gage readings taken during any given day, and weighting the values in accordance with the proportional part of the day to which each gage height is applicable. Daily discharge estimated for days when gage heights are missing. No correction was made for possible effect of backwater from ice during December. Discharge Jan. 1 to Apr. 15 estimated, because of ice, from one discharge measurement, observer's notes, climatologic records, discharge of adjacent drainage areas, and storage in Moosehead Lake:

Period.	Mean discharge (second-feet).	
	Estimate.	Range.
January	750	650-900
February	1,400	900-1,800
March	1,200	800-1,800
April 1-15	700	550-1,200

Monthly discharge of Kennebec River at The Forks, Maine, for 1912.

[Drainage area, 1,570 miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			750	0.478	0.55	D.
February			1,400	.892	.96	C.
March			1,200	.764	.88	D.
April	5,560		2,460	1.57	1.75	C.
May	14,400	2,800	8,520	5.43	6,26	A.
June	13,400	2,380	4,990	3.18	3.55	B.
July	3,520	2,100	2,760	1.76	2.03	A.
August	3,380	886	2,130	1.36	1.57	A.
September	2,220	953	1,610	1.03	1.15	A.
October	1,810	896	1,430	.911	1.05	A.
November	3,500	861	1,520	.968	1.08	A.
December	2,540	1,460	1,830	1.17	1.35	A.
The year	14,400		2,560	1.63	22.18	

NOTE.—See footnotes to table of daily discharge.

KENNEBEC RIVER AT WATERVILLE, MAINE.

Location.—At the dam and mill of the Hollingsworth & Whitney Co., at Waterville, 2 miles above the mouth of Sebasticook River and about 3½ miles above the mouth of Messalonskee Stream.

Records available.—March 22, 1892, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—4,270 square miles.

Gage.—Rod gages in the pond above the dam and in the tailrace of the mill.

Determination of discharge.—The discharge is computed from the flow over the dam, through the logway, and through 18 wheels of the mill. Most of the wheels were rated at Holyoke, Mass., under practically the same head as that used at Waterville—about 23 feet. Methods and diagrams for estimating the flow have been developed by the company, and the amount lost by leakage and used for washing and various purposes in the mill is estimated. When the flow of the river is less than about 3,500 second-feet all the water is used through the wheels.

Winter flow.—As a rule, not affected by ice. During most years the winter flow passes through the wheels of the mill.

Artificial control.—Numerous power plants and much storage above the station.

Accuracy.—Results are considered fair only, as many wheels are in operation and only one reading a day is made for each wheel, but the record is valuable because of its length and continuity.

Cooperation.—Records are obtained and estimates of daily discharge are frunished by the Hollingsworth & Whitney Co.

Daily discharge, in second-feet, of Kennebec River at Waterville, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,630	3,100	3,220	9,100	20,200	36,300	4,150	3,610	[a]2,770	3,760	5,900	[a]2,010
2	2,960	3,150	3,270	9,060	20,000	[a]35,800	3,900	3,870	3,930	3,790	6,150	4,330
3	3,070	3,440	[a]1,520	7,570	28,900	25,800	4,080	4,190	3,970	3,760	[a]7,480	5,350
4	3,180	[a]2,220	3,580	9,030	24,000	23,500	3,150	[a]3,600	3,740	3,710	6,290	6,780
5	3,190	3,450	3,580	6,060	[a]16,500	22,100	5,290	6,610	3,530	3,380	5,710	6,960
6	3,060	3,330	3,270	5,740	16,700	18,900	5,400	6,220	3,560	[a]1,700	4,860	6,070
7	[a]928	3,210	3,000	[a]6,000	18,800	17,300	[a]3,550	6,010	3,270	3,140	4,960	7,120
8	3,050	3,020	2,830	9,160	21,300	16,100	4,150	5,200	[a]1,580	3,570	6,120	[a]7,310
9	3,150	3,200	3,100	22,000	19,600	[a]14,600	4,060	4,560	3,730	3,280	25,700	4,460
10	2,940	3,090	[a]1,460	19,200	22,200	14,500	3,810	4,230	3,060	2,440	[a]14,500	5,580
11	2,550	[a]1,540	2,630	19,900	22,100	11,300	3,570	[a]2,710	3,350	2,660	12,200	5,010
12	2,980	3,140	3,320	18,300	[a]22,900	8,070	5,400	4,320	2,310	2,870	10,400	5,340
13	3,090	2,980	3,220	18,400	20,800	9,290	5,570	7,470	2,430	[a]1,330	8,580	7,150
14	[a]1,240	2,800	3,740	[a]17,500	22,200	8,890	[a]2,760	7,430	2,800	4,170	6,990	4,810
15	3,020	2,800	4,120	19,600	26,500	7,910	3,750	6,760	[a]1,500	4,090	7,390	[a]2,140
16	4,010	2,560	5,910	21,000	22,700	[a]6,690	3,680	6,640	3,730	3,860	7,660	5,460
17	3,660	3,210	[a]6,420	21,300	19,700	5,900	5,640	6,170	3,780	3,450	[a]7,140	5,310
18	3,660	[a]1,160	8,090	32,600	25,100	8,070	3,560	[a]3,200	3,650	3,470	6,450	4,680
19	3,730	3,130	7,520	40,500	[a]24,200	8,010	3,640	4,540	3,730	3,500	6,670	4,340
20	3,400	3,100	8,490	35,400	19,700	8,110	3,460	4,400	3,330	[a]1,730	5,270	4,710
21	[a]1,890	3,060	8,250	[a]29,200	16,800	7,810	[a]2,200	4,460	4,020	3,800	5,980	5,750
22	3,600	3,280	7,340	28,600	17,100	7,160	3,660	4,380	[a]5,990	3,670	4,840	[a]2,950
23	3,600	3,280	8,670	28,000	14,900	[a]5,710	3,700	3,920	6,340	3,460	4,650	4,880
24	3,550	3,230	[a]6,560	45,500	13,500	7,420	3,650	4,610	5,440	3,460	[a]5,270	4.610
25	3,560	[a]2,250	5,390	34,600	17,800	5,580	3,060	[a]1,640	4,550	7,480	5,640	2,720
26	3,630	3,620	5,960	29,500	[a]18,700	6,610	3,190	2,910	3,870	24,400	5,730	4,730
27	3,380	3,730	3,830	29,500	18,900	3,710	3,230	3,720	3,390	[a]24,600	5,900	3,870
28	[a]2,320	3,560	4,370	[a]25,100	17,300	5,280	[a]2,370	3,210	3,330	16,700	5,280	3,730
29	3,300	3,520	4,690	26,900	15,500	5,070	3,420	3,970	[a]2,040	11,000	6,150	[a]1,630
30	2,910	....	6,000	21,900	11,900	[a]3,610	3,410	4,050	3,330	8,840	5,070	3,510
31	3,140	....	[a]4,040	....	35,300	....	3,670	3,760	....	6,590	....	3,940

[a] Sunday.

Monthly discharge of Kennebec River at Waterville, Maine, for 1912.

[Drainage area, 4,270 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	4,010	928	3,040	0.712	0.82
February	3,730	1,160	3,010	.705	.76
March	8,670	1,460	4,750	1.11	1.28
April	45,500	5,740	21,500	5.04	5.62
May	35,300	11,900	20,400	4.78	5.51
June	36,300	3,610	12,200	2.86	3.19
July	5,640	2,200	3,810	.892	1.03
August	7,470	1,640	4,590	1.07	1.23
September	6,340	1,500	3,540	.829	.92
October	24,600	1,330	5,730	1.34	1.54
November	25,700	4,650	7,330	1.72	1.92
December	7,310	1,630	4,750	1.11	1.28
The year	45,500	928	7,880	1.85	25.10

DEAD RIVER AT THE FORKS, MAINE.

Location.—One-eighth mile above farmhouse of Jeremiah Durgin, 1½ miles west of the Forks.

Records available.—September 29, 1901, to August 15, 1907; March 16, 1910, to December 31, 1912. Data also in annual report of Maine State Water Storage Commission.

Drainage area.—878 square miles.

Gage.—Inclined staff bolted to large bowlder on the left bank, a short distance from observer's house; datum unchanged.

Channel.—Practically permanent; banks medium high; overflowed only at extreme high water.

Discharge measurements.—Made from a car suspended from a cable a short distance above the gage.

Winter flow.—Affected by ice.

Artificial control.—A number of dams on the lakes above; used solely for log driving.

Accuracy.—Relation between gage height and discharge affected by ice during the winter and by the control of the stream for log driving during May and June. Special note is made of the length and time of the drive and of the maximum and minimum head used.

Discharge measurements of Dead River at The Forks, Maine, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 22	F. E. Pressey	2.52	282
Aug. 22	do	1.85	1,470
23	do	1.18	589

Daily gage height, in feet, of Dead River at The Forks, Maine, for 1912.

[Eva M. Forsythe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.40			3.00	4.25	4.00	1.25	0.85	1.10	1.25	1.90	1.50
2	1.35			2.90	3.85	3.60	1.20	1.00	1.10	1.40	1.82	1.60
3	1.30		2.00	2.85	3.10	3.60	1.15	1.15	1.00	1.45	1.82	1.72
4	1.30	2.10		2.75	3.20	3.55	1.10	1.90	1.00	1.55	1.75	1.75
5	1.45			2.70	3.05	2.45	1.05	2.60	.95	1.45	1.65	1.80
6	1.50			2.60	4.00	2.80	1.00	2.00	.90	1.35	1.58	1.88
7	1.50			2.65	3.10	2.55	1.10	1.85	1.00	1.30	1.58	1.80
8	1.50			2.75	2.45	2.45	1.10	1.45	1.10	1.25	2.08	1.80
9	1.50			2.75	3.55	2.90	1.10	1.65	1.20	1.20	3.08	1.80
10	1.50		2.70	2.65	2.75	2.00	1.05	1.80	1.10	1.20	2.98	1.80
11	1.50	2.40		2.40	4.60	1.85	1.00	1.75	1.10	1.20	2.60	1.80
12	1.50			2.30	4.45	1.80	.90	1.40	1.10	1.25	2.38	1.78
13	1.55			2.35	7.50	1.70	.90	2.50	1.00	1.35	2.15	1.75
14	1.90			2.45	7.75	2.05	.90	2.30	1.05	1.40	2.10	1.70
15	2.25			2.65	7.00	1.80	.90	2.10	1.25	1.30	2.00	1.70
16	2.45			2.70	3.10	1.70	.90	2.50	1.30	1.30	2.00	1.68
17	2.50		3.00	3.90	3.70	1.75	.90	2.50	1.15	1.30	1.90	1.60
18	2.65	2.20		4.55	2.75	1.75	.80	2.00	1.15	1.25	1.88	1.50
19	2.75			4.95	2.70	1.60	.80	2.00	1.20	1.20	1.80	1.50
20	2.80			4.75	2.85	1.75	.80	2.10	1.40	1.20	1.75	1.50
21				4.45	3.05	1.65	.80	1.85	2.35	1.10	1.70	1.58
22		2.52		3.10	3.20	1.85	.80	1.80	2.50	1.10	1.62	1.50
23				4.75	3.30	1.60	.80	1.20	2.25	1.10	1.60	1.50
24		2.50	3.00	5.30	2.95	1.70	.80	1.15	2.00	1.20	1.60	1.48
25				4.70	3.20	1.60	.80	1.20	1.85	1.85	1.60	1.45
26				5.00	3.05	1.60	.80	1.30	1.60	3.60	1.60	1.48
27				4.40	3.45	1.60	.80	1.65	1.35	3.65	1.60	1.50
28	1.40			4.30	2.80	1.50	.80	1.45	1.25	3.05	1.58	1.50
29				3.00	2.85	1.45	.80	1.45	1.20	2.52	1.52	1.50
30				3.20	3.40	1.35	.80	1.25	1.20	2.15	1.50	1.50
31			3.00		3.30		.80	1.15		2.00		1.50

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5 to Apr. 11. Observer notes: Apr. 9, ice went out of river; May 10 and 13, water from dam; Aug. 13, driving pulp in river. Gage heights affected little if any by ice during December.

Daily discharge, in second-feet, of Dead River at The Forks, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	840				6,960	6,140	665	282	510	665	1,540	965
2	780				5,680	4,970	610	415	510	840	1,420	1,100
3	720				3,770	4,970	560	560	415	902	1,420	1,270
4	720				3,990	4,840	510	1,540	415	1,030	1,320	1,320
5					3,660	2,470	462	1,700	370	902	1,170	1,390
6					6,140	3,140	415	1,700	325	780	1,070	1,510
7					3,770	2,660	510	1,460	415	720	1,070	1,390
8					2,470	2,470	510	902	510	665	1,830	1,390
9					4,840	3,340	510	1,170	610	610	3,730	1,390
10					3,040	1,700	462	1,390	510	610	3,510	1,390
11					8,200	1,460	415	1,320	510	610	2,750	1,390
12				2,200	7,660	1,390	325	840	510	665	2,340	1,360
13				2,290	20,600	1,240	325	2,560	415	780	1,940	1,320
14				2,470	21,900	1,780	325	2,200	462	840	1,860	1,240
15				2,840	18,200	1,390	325	1,860	665	720	1,700	1,240
16				2,940	3,770	1,240	325	2,560	720	720	1,700	1,210
17				5,830	5,240	1,320	325	2,560	560	720	1,540	1,100
18				8,020	3,040	1,320	240	1,700	560	665	1,510	965
19				9,510	2,940	1,100	240	1,700	610	610	1,390	965
20				8,760	3,240	1,320	240	1,860	840	610	1,320	965
21				7,660	3,660	1,170	240	1,460	2,290	510	1,240	1,070
22				3,770	3,990	1,460	240	1,390	2,560	510	1,130	965
23				8,760	4,220	1,100	240	610	2,120	510	1,100	965
24				10,900	3,440	1,240	240	560	1,700	610	1,100	940
25				8,570	3,990	1,100	240	610	1,460	1,460	1,100	902
26				9,700	3,660	1,100	240	720	1,100	4,970	1,100	940
27				7,480	4,580	1,160	240	1,170	780	5,100	1,100	965
28				7,130	3,140	965	240	902	665	3,660	1,070	965
29				3,550	3,240	902	240	902	610	2,600	992	965
30				3,990	4,460	780	240	665	610	1,940	965	965
31					4,220		240	560		1,700		965

NOTE.—Daily discharge computed from a rating curve fairly well defined below 16,000 second-feet. High discharge May 11 to 15, result of artificial control. Discharge Jan. 5 to Apr. 11, estimated, because of ice, from one discharge measurement, gage observer's notes, climatologic records, and discharge of adjacent drainage areas:

Period.	Mean discharge (second-feet).	
	Estimate.	Range.
January 5–31	430	230–700
February	270	250–290
March	650	300–1,000
April 1–11	1,300	1,000–2,000

Monthly discharge of Dead River at The Forks, Maine, for 1912.

[Drainage area, 878 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			473	0.539	0.62	D.
February			270	.308	.33	C.
March			650	.740	.85	D.
April	10,900		4,360	4.97	5.54	C.
May	21,900	2,470	5,860	6.67	7.69	B.
June	6,140	780	2,040	2.32	2.59	A.
July	665	240	353	.402	.46	B.
August	2,560	282	1,280	1.46	1.68	A.
September	2,560	325	811	.924	1.03	A.
October	5,100	510	1,230	1.40	1.61	A.
November	3,730	965	1,570	1.79	2.00	A.
December	1,510	902	1,140	1.30	1.50	B.
The year	21,900		1,670	1.90	25.90	

NOTE.—See footnotes to table of daily discharge.

SANDY RIVER NEAR FARMINGTON, MAINE.

Location.—At Fairbanks highway bridge, 3 miles above Farmington.

Records available.—July 11, 1910, to December 31, 1912. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—270 square miles.

Gage.—Standard chain.

Channel.—Practically permanent; left bank high; right bank subject to overflow in extreme freshets; current swift at high and medium stages but sluggish during low water.

Discharge measurements.—Made from the bridge.

Winter flow.—Affected by ice.

Artificial control.—No storage basins above the station; the water-power dam at Phillips may slightly affect the flow at the station.

Discharge measurements of Sandy River near Farmington, Maine, in 1912.

[Hydrographer, F. E. Pressey.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-feet.*		*Feet.*	*Sec.-feet.*		*Feet.*	*Sec.-feet.*
Apr. 29	5.22	1,440	May 1	5.31	1,430	May 2	5.17	1,370
30	5.24	1,420	1	5.17	1,350	3	5.12	1,330
30	5.11	1,300	2	5.36	1,520	3	5.02	1,230

Daily gage height, in feet, of Sandy River near Farmington, Maine, for 1912.

[L. A. Daggitt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				5.1	5.3	6.6	2.4	2.5	2.5	3.1	3.6	3.9
2			4.0	5.0	5.4	5.2	2.4	2.6	2.4	3.0	4.7	3.5
3		4.0		4.6	5.1	5.0	2.4	2.8	2.4	2.9	4.0	4.0
4				4.5	5.1	4.6	2.4	3.3	2.5	2.7	3.7	4.4
5				4.3	4.8	4.1	2.4	2.7	2.5	2.7	3.6	3.9
6	4.0			4.0	4.8	3.9	2.4	2.7	2.4	2.7	3.7	3.9
7				5.0	5.05	4.0	2.4	2.5	2.5	2.6	3.7	3.9
8				6.4	4.95	3.7		2.4	2.5	2.5	8.65	3.9
9			4.0	5.1	4.9	3.7	2.4	2.4	2.4	2.6	5.8	3.5
10		4.0		4.7	5.45	3.6	2.4	2.4	2.3	2.5	4.6	5.0
11				4.5	5.6	3.3	2.4	2.5	2.35	2.5	4.2	4.9
12				4.5	4.7	3.3	2.3	4.0	2.5	2.5	4.0	4.9
13	3.8			4.7	5.25	3.4	2.3	5.25	2.4	2.7	3.9	4.9
14				5.0	6.2	3.3	2.3	3.5	2.3	2.7	3.8	5.5
15				5.5	5.0	3.2	2.4	3.2	2.3	2.7	3.8	5.5
16			5.2	7.6	4.5	3.2	2.3	2.7	2.3	2.7	3.7	5.4
17		4.0		8.2	5.5	3.2	2.25	2.7	2.7	2.6	3.7	5.1
18				6.7	5.7	3.1	2.2	2.6	2.5	2.6	3.7	4.8
19				7.0	4.7	3.0	2.3	2.5	2.4	2.6	3.5	4.9
20	4.3			6.4	4.3	3.0	2.3	2.5	2.6	2.6	3.4	5.1
21				6.0	4.3	2.9	2.4	2.5	3.6	2.6	3.5	4.9
22				6.6	4.2	3.0	2.3	2.4	3.15	2.5	3.5	4.9
23			4.8	8.75	4.0		2.6	2.4	2.9	2.5	3.6	4.6
24		5.6		6.8	4.0	2.7	2.4	2.4	2.7	5.2	3.7	4.5
25				6.0	5.0	2.7	2.3	2.5	2.6	9.45	3.7	4.4
26				6.2	4.2	2.6	2.25	3.4	2.6	7.9	3.7	4.2
27	4.0			6.7	3.9	2.6	2.25	2.8	2.5	5.6	3.6	4.2
28				6.4	3.7	2.5	2.25	2.7	2.5	4.5	3.6	4.3
29			4.5	5.4	3.5	2.5	2.25	2.7	2.5	4.0	4.2	4.3
30			5.2	5.2	9.1	2.4	2.3	2.7	3.5	3.9	4.0	4.4
31					6.4		2.3	2.6		3.7		4.7

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to Apr. 11, and Nov. 29 to Dec. 1.

Daily discharge, in second-feet, of Sandy River near Farmington, Maine, for 1911–12.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.									
1	....	3,400	495	68	167	101	353	193	431
2	....	2,690	517	52	101	83	221	193	353
3	....	2,140	283	67	101	83	167	193	283
4	....	1,140	221	38	67	101	283	167	221
5	....	923	167	38	52	101	473	167	473
6	....	787	121	52	38	83	391	167	667
7	....	993	143	38	38	353	251	193	562
8	....	923	83	38	52	167	193	667	517
9	....	1,140	101	25	143	101	167	473	353
10	....	923	101	38	101	121	101	317	283
11	....	923	101	25	52	83	143	283	353
12	....	517	317	25	52	83	101	283	431
13	....	613	495	38	67	83	101	317	2,040
14	....	517	517	13	38	83	121	517	1,220
15	....	391	391	13	38	83	101	353	667
16	....	317	283	83	83	101	83	431	517
17	....	317	317	67	517	101	83	562	473
18	1,730	251	251	52	283	167	83	725	391
19	1,460	251	193	193	251	121	452	923	353
20	1,300	221	193	101	391	121	1,140	517	283
21	1,220	221	143	67	221	83	923	251	353
22	1,060	167	121	52	143	83	283	283	473
23	923	221	101	67	101	167	562	431	562
24	787	167	101	38	67	101	562	353	1,380
25	1,540	251	83	25	67	101	391	283	725
26	2,140	251	67	38	67	517	431	353	562
27	2,040	283	83	38	67	391	391	353	473
28	2,800	167	67	25	67	193	317	283	391
29	3,160	167	67	92	101	167	221	353	350
30	2,800	121	83	431	391	193	193	667	350
31	....	121	....	221	221	....	193	....	300
1912.									
1	....	1,460	2,800	67	83	83	221	391	360
2	....	1,540	1,380	67	101	67	193	993	353
3	....	1,300	1,220	67	143	67	167	562	562
4	....	1,300	923	67	283	83	121	431	787
5	....	1,060	613	67	121	83	121	391	517
6	....	1,060	517	67	121	67	121	431	517
7	....	1,260	562	67	83	83	101	431	517
8	....	1,180	431	67	67	83	83	5,520	517
9	....	1,140	431	67	67	67	101	1,930	353
10	....	1,590	391	67	67	52	83	923	1,220
11	....	1,730	283	67	83	60	83	667	1,140
12	853	993	283	52	562	83	83	562	1,140
13	993	1,420	317	52	1,420	67	121	517	1,140
14	1,220	2,360	283	52	353	52	121	473	1,640
15	1,640	1,220	251	67	251	52	121	473	1,640
16	4,050	853	251	52	121	52	121	431	1,540
17	4,880	1,640	251	45	121	121	101	431	1.300
18	2,920	1,830	221	38	101	83	101	431	1,060
19	3,280	993	193	52	83	67	101	353	1,140
20	2,580	725	193	52	83	101	101	317	1,300
21	2,140	725	167	67	83	391	101	353	1,140
22	2,800	667	193	52	67	236	83	353	1,140
23	5,680	562	157	101	67	167	83	391	923
24	3.040	562	121	67	67	121	1,380	431	853
25	2,140	1,220	121	52	83	101	6,720	431	787
26	2,360	667	101	45	317	101	4,460	431	667
27	2,920	517	101	45	143	83	1,730	391	667
28	2,580	431	83	45	121	83	853	391	725
29	1,540	353	83	45	121	83	562	380	725
30	1,380	6.200	67	52	121	353	517	370	787
31	....	2,580	....	52	101	....	431	....	993

NOTE.—Daily discharge computed from a rating curve well defined between 50 and 2,000 second-feet. Above 2,000 second-feet curve is simply an extension and estimates of daily discharge should be used with caution. Discharge Jan. 1 to Apr. 17, 1911, Dec. 29, 1911, to Apr. 11, 1912, and Nov. 29 to Dec. 1, 1912, estimated, because of ice, from gage observer's notes, weekly gage heights, climatologic records, and discharge of adjacent drainage areas: January, 1911, 100 second-feet; February, 1911, 80 second-feet; March, 1911, 130 second-feet; Apr. 1–17, 1911, 600 second-feet; January, 1912, 170 second-feet; February, 1912, 130 second-feet; March, 1912, 300 second-feet; Apr. 1–11, 1912, 700 second-feet; Daily discharge interpolated for days when gage was not read.

Monthly discharge of Sandy River near Farmington, Maine, for 1911–12.

[Drainage area, 270 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
January	....	....	100	0.370	0.43	D.
February	....	....	80	.296	.31	D.
March	....	....	130	.481	.55	D.
April	....	....	1,110	4.11	4.59	C.
May	3,400	121	694	2.57	2.96	B.
June	517	67	207	.767	.86	A.
July	431	13	69.6	.258	.30	B.
August	517	38	134	.496	.57	A.
September	517	83	144	.533	.59	A.
October	1,140	83	306	1.13	1.30	A.
November	923	167	375	1.39	1.55	A.
December	2,040	221	542	2.01	2.32	B.
The year	3,400	....	324	1.20	16.33	
1912.						
January	....	....	170	0.630	0.73	D.
February	....	....	130	.481	.52	D.
March	....	....	300	1.11	1.28	D.
April	5,680	....	1,890	7.00	7.81	C.
May	6,200	353	1,330	4.93	5.68	A.
June	2,800	67	433	1.60	1.78	A.
July	101	38	58.8	.218	.25	B.
August	1,420	67	181	.670	.77	A.
September	391	52	106	.393	.44	A.
October	6,720	83	622	2.30	2.65	B.
November	5,520	317	686	2.54	2.83	B.
December	1,640	353	908	3.36	3.87	B.
The year	6,720	....	568	2.10	28.61	

NOTE.—See footnotes to table of daily discharge.

SEBASTICOOK RIVER AT PITTSFIELD, MAINE.

Location.—At steel highway bridge just above the Maine Central Railroad bridge in the town of Pittsfield.

Records available.—July 27, 1908, to December 31, 1912. Data also in annual reports of Maine State Water Storage Commission.

Drainage area.—320 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Practically permanent; banks high and rocky and not subject to overflow; stream confined between the abutments of the bridge.

Discharge measurements.—Made from the highway bridge.

Winter flow.—Not generally affected by ice, as the rapid fall and proximity of the power plant immediately above the station tend to keep the river open.

Artificial control.—About 800 feet upstream from the station is the dam of the Robert Dobson Co. and the Smith Wooden Co.; about half a mile farther upstream is the dam of the Waverly woolen mill. About 5 miles below the station and 2 miles from Burnham is the dam of the Sebasticook Power Co., but the fall of the stream prevents backwater from the lower dam.

Accuracy.—The accuracy of the mean daily gage height given in the table below is more or less affected by fluctuations in stage caused by the operation of the dams above the station for night storage. Conditions favor the accurate determination of discharge, and a fair rating curve has been developed; a few more measurements are needed to closely determine the flow at extreme high and extreme low stages.

Daily gage height, in feet, of Sebasticook River at Pittsfield, Maine, for 1912.

[Easter B. Morrill, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.9	3.4	3.05	4.7	4.55	5.05	2.9	3.2	2.65	3.05	4.2	3.6
2	3.85	3.5	3.05	4.7	4.5	5.0	3.0	3.1	3.3	3.0	4.25	3.6
3	3.8	3.4	2.9	4.75	4.4	5.2	2.95	2.9	3.25	3.05	4.2	3.5
4	3.75	2.9	3.15	4.65	4.2	5.0	2.95	2.8	3.2	3.05	4.2	3.5
5	3.65	3.1	3.3	4.75	3.8	5.1	2.95	3.05	3.3	2.75	4.25	3.55
6	3.55	3.4	3.25	4.6	3.55	5.0	3.0	2.95	3.25	2.55	4.3	3.8
7	2.9	3.45	3.25	4.35	3.7	4.45	2.95	3.0	2.6	2.8	4.15	3.7
8	3.7	3.35	3.2	4.75	3.65	4.05	2.85	2.9	2.65	2.8	4.15	3.5
9	3.65	3.35	2.9	4.95	3.65	4.0	2.75	3.25	3.15	2.9	4.7	3.8
10	3.7	3.05	2.75	5.15	3.6	4.1	2.85	3.2	3.2	2.9	5.2	3.95
11	3.6	2.85	2.9	5.1	3.45	4.0	2.8	2.85	3.3	2.7	5.3	3.9
12	3.55	3.05	3.15	5.05	3.7	4.15	2.8	3.05	3.2	2.4	5.05	3.8
13	3.45	3.3	3.35	4.95	3.6	3.9	2.75	3.25	3.15	2.4	4.9	3.75
14	3.2	3.2	3.4	4.9	3.75	3.8	2.45	3.25	2.8	2.95	4.7	3.5
15	3.65	3.25	3.75	5.15	3.8	3.6	2.95	3.05	2.5	2.95	4.6	3.4
16	3.65	3.3	3.9	5.9	3.75	3.4	3.0	2.9	3.0	2.9	4.45	3.85
17	3.65	3.1	3.25	6.05	3.7	3.55	3.0	2.85	3.0	3.05	4.4	3.7
18	3.65	2.85	4.0	6.2	3.55	3.6	3.05	2.8	3.2	3.15	4.3	3.5
19	3.45	3.0	4.35	6.4	3.65	3.7	3.05	3.15	3.15	2.9	4.25	3.5
20	3.15	3.25	4.55	6.6	3.9	3.6	2.8	3.15	3.15	2.8	4.1	3.6
21	2.9	3.1	4.6	6.7	3.85	3.5	2.7	3.2	2.9	3.1	4.0	3.7
22	3.4	3.3	4.5	6.65	4.05	3.45	2.95	3.05	2.6	3.2	3.95	3.5
23	3.35	3.3	4.55	6.5	4.1	3.15	3.05	3.15	3.1	3.3	3.85	3.5
24	3.35	3.25	4.5	6.4	3.7	3.5	3.05	3.0	3.15	3.5	3.7	3.6
25	3.5	2.9	4.35	6.35	3.7	3.35	2.9	2.85	3.2	3.6	3.9	3.2
26	3.4	3.05	4.2	6.3	3.5	3.4	3.0	3.15	3.15	3.75	3.9	3.3
27	3.1	3.2	4.25	6.2	3.65	3.5	2.85	3.2	3.2	3.7	3.9	3.3
28	2.9	3.3	4.45	5.7	4.05	3.5	2.8	3.25	2.95	3.95	3.7	3.4
29	3.2	3.15	4.65	5.2	4.4	2.85	3.1	3.35	2.5	4.15	3.7	3.2
30	3.35	....	4.6	5.0	4.85	2.7	3.1	3.25	2.9	4.25	3.6	3.35
31	3.4	....	4.55	....	4.7	....	3.1	2.95	....	4.3	....	3.4

NOTE.—Relation of gage height to discharge probably not affected by ice during 1912.

Daily discharge, in second-feet, of Sebasticook River at Pittsfield, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	668	395	250	1,470	1,300	1,900	193	310	111	250	938	485
2	634	438	250	1,470	1,250	1,830	230	270	352	230	989	485
3	600	395	193	1,530	1,140	2,080	212	193	331	250	938	438
4	570	193	290	1,420	938	1,830	212	158	310	250	938	438
5	512	270	352	1,530	600	1,960	212	250	352	142	989	462
6	462	395	331	1,360	462	1,830	230	212	331	84	1,040	600
7	193	416	331	1,090	540	1,200	212	230	97	158	888	540
8	540	374	310	1,530	512	792	176	193	111	158	888	438
9	512	374	193	1,770	512	745	142	331	290	193	1,470	600
10	540	250	142	2,020	485	838	176	310	310	193	2,080	706
11	485	176	193	1,960	416	745	158	176	352	125	2,200	668
12	462	250	290	1,900	540	888	158	250	310	50	1,900	600
13	416	352	374	1,770	485	668	142	331	290	50	1,710	570
14	310	310	395	1,710	570	600	60	331	158	212	1,470	438
15	512	331	570	2,020	600	485	212	250	71	212	1,360	395
16	512	352	668	2,990	570	395	230	193	230	193	1,200	634
17	512	270	331	3,200	540	462	230	176	230	250	1,140	540
18	512	176	745	3,400	462	485	250	158	310	290	1,040	438
19	416	230	1,090	3,660	512	540	250	290	290	193	989	438
20	290	331	1,300	3,940	668	485	158	290	290	158	838	485
21	193	270	1,360	4,070	634	438	125	310	193	270	745	540
22	395	352	1,250	4,000	792	416	212	250	97	310	706	438
23	374	352	1,300	3,800	838	290	250	290	270	352	634	438
24	374	331	1,250	3,660	540	438	250	230	290	438	540	485
25	438	193	1,090	3,600	540	374	193	176	310	485	668	310
26	395	250	938	3,530	438	395	230	290	290	570	668	352
27	270	310	989	3,400	512	438	176	310	310	540	668	352
28	193	352	1,200	2,720	792	438	158	331	212	706	540	395
29	310	290	1,420	2,080	1,140	176	270	374	71	888	540	310
30	374	....	1,360	1,830	1,650	125	270	331	193	989	485	374
31	395	....	1,300	....	1,470	....	270	212	....	1,040	....	395

NOTE.—Daily discharge computed from a rating curve fairly well defined above 70 second-feet, and poorly defined below that point.

Monthly discharge of Sebasticook River at Pittsfield, Maine, for 1912.

[Drainage area 320 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	668	193	431	1.35	1.56	B.
February	438	176	310	.969	1.05	B.
March	1,420	142	711	2.22	2.56	B.
April	4,070	1,090	2,480	7.75	8.65	B.
May	1,650	416	724	2.26	2.61	B.
June	2,080	125	810	2.53	2.82	B.
July	270	60	202	.631	.73	B.
August	374	158	258	.806	.93	B.
September	352	71	245	.766	.85	B.
October	1,040	50	330	1.03	1.19	B.
November	2,200	485	1,040	3.25	3.63	B.
December	706	310	477	1.49	1.72	B.
The year	4,070	50	665	2.08	28.30	

COBBOSSEECONTEE STREAM AT GARDINER, MAINE.

Location.—At the dam of the Gardiner Water Power Co., in the city of Gardiner.

Records available.—June 16, 1890, to December 31, 1912.

Drainage area.—220 square miles. Measured on recently completed topographic sheets. Value given in previous reports about 10 per cent too large. See *Accuracy*.

Gages.—One in pond above dam and one in tailrace of power house.

Determination of flow.—The discharge is determined by considering (1) the flow over the dam, usually nothing except for a short time in the spring; (2) the flow through two gates; and (3) the flow through a 39-inch Hercules wheel. The computations of daily discharge are made by the engineers of the S. D. Warren Co. from tables of discharge based on careful experiments.

Winter flow.—Not affected by ice.

Artificial control.—The extensive lakes in the basin are controlled by storage dams and the stream affords a remarkable example of the regularity of flow that can be obtained with proper storage. Except for a short time in the spring no water is wasted.

Accuracy.—Results are considered good for a station of this type. Run-off per square mile and depth in inches on drainage area, as published in earlier reports, should be recomputed by means of new value for drainage area.

Cooperation.—Station maintained by the S. D. Warren Co., which furnished the records of daily discharge for publication.

Daily discharge, in second-feet, of Cobbosseecontee Stream at Gardiner, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	180	200	230	580	285	1,580	260	250	[a] 0	190	210	[a] 0
2	180	200	230	580	285	[a]1,550	260	250	260	190	210	260
3	180	200	[a] 0	570	285	1,580	260	250	260	190	[a] 0	260
4	180	[a] 0	230	540	285	1,470	130	[a] 0	260	190	260	260
5	170	200	230	530	[a] 0	1,270	170	260	260	190	250	260
6	170	215	230	520	270	940	260	260	260	[a] 0	250	260
7	[a] 0	230	230	[a] 500	270	490	[a] 0	260	260	190	250	260
8	170	230	230	540	270	290	250	260	[a] 0	190	250	[a] 0
9	170	230	200	660	270	[a] 0	250	260	250	190	250	260
10	170	230	[a] 0	800	270	290	250	260	250	190	[a] 0	260

[a] Sunday.

Daily discharge, in second-feet, of Cobbosseecontee Stream at Gardiner, Maine, for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	170	a 0	230	870	270	290	250	a 0	250	190	260	260
12	170	230	230	930	a 0	290	250	260	250	190	260	260
13	170	230	230	940	260	290	250	260	250	a 0	260	260
14	a 0	230	240	a 930	260	290	a 0	260	250	190	260	260
15	170	230	250	930	260	290	250	260	a 0	190	260	a 0
16	170	230	280	1,040	260	a 0	250	260	190	190	260	260
17	170	230	a 650	1,130	260	260	250	260	190	190	a 0	260
18	170	a 0	720	960	400	260	250	a 0	190	190	260	260
19	170	230	740	860	a 530	260	250	260	190	190	260	260
20	170	230	770	900	560	260	250	260	190	a 0	260	260
21	a 0	230	800	a 1,050	560	260	a 0	260	190	190	260	260
22	200	230	780	980	430	260	250	260	a 0	190	260	a 0
23	200	230	730	980	310	a 0	250	260	190	190	260	260
24	200	230	a 660	1,000	300	260	250	260	190	190	a 0	260
25	200	a 0	570	1,000	290	260	250	a 0	190	190	260	130
26	200	230	380	850	a 0	260	250	260	190	190	260	130
27	200	230	310	680	290	260	250	260	190	a 0	260	260
28	a 0	230	310	a 400	290	260	a 0	260	190	210	130	260
29	200	230	310	300	290	260	250	260	a 0	210	130	a 0
30	200	......	350	285	300	a 0	250	260	190	210	250	260
31	200	......	a 470	......	1,000	......	250	260	......	210	......	260

a Sunday.

Monthly discharge of Cobbosseecontee Stream at Gardiner, Maine, for 1912.

[Drainage area, 220 square miles.]

Month.	Discharge in second-feet.				Run-off, (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	200	0	158	0.718	0.83
February	230	0	194	.882	.95
March	800	0	381	1.73	1.99
April	1,130	285	761	3.46	3.86
May	1,000	0	310	1.41	1.63
June	1,580	0	468	2.13	2.38
July	260	0	215	.968	1.12
August	260	0	225	1.02	1.18
September	260	0	184	.836	.93
October	210	0	174	.791	.91
November	260	0	211	.959	1.07
December	260	0	210	.955	1.10
The year	1,580	0	290	1.32	17.95

ANDROSCOGGIN RIVER BASIN.

ANDROSCOGGIN RIVER AT ERROL DAM, N. H.

Location.—Errol dam, 1 mile above the town of Errol, N. H.

Records available.—January 1, 1905, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,095 square miles.

Gage.—Movable rod gage; readings taken each day from the sill of deep gate No. 6; elevation of zero of gage or sill of gate is 1,231.3 feet above mean sea level.

Discharge.—Computed from discharge through 14 gates in the dam by means of coefficients determined from a few discharge measurements.

The dam is a wooden structure completely housed over, about 175 feet between abutments. Extensive repairs were made on the dam during November and December, 1912. The entire flow passes through gates of different sizes, 14 in all. There is no provision for overflow besides the gates. Beginning at the left end, the gates are as follows:

One gate 10 feet deep by 15 feet wide, seldom used; three gates 10½ feet deep by 15 feet wide, open most of the time; nine gates 15 feet deep by 7 feet wide in the clear (so-called deep gates), open a portion of the time only; one gate 15 feet deep by 5 feet wide, gristmill gate and used only occasionally. The cap of all the 14 gates is one continuous beam and on the same level, thus making the bottom of the various gates at different levels.

A "deadhead" of 2.66 feet exists a short distance above the present dam, this point at present controlling the low flow.

The depth on the deep gates does not indicate the true height of water in Umbagog Lake on account of this "deadhead" formed by the old dam and by the bar at "Quick Water Point," the lowest point of which is about 4 feet above the sill of the present dam.

Winter flow.—Little affected by ice.

Artificial control.—Errol dam controls the storage of Umbagog Lake, the lower of the Rangeley series of lakes, comprising the principal storage of the Androscoggin River and amounting to about 19 billion cubic feet, and also a recently developed storage site on Magalloway River created by the Azicohos dam, which amounts to about 8 billion cubic feet, thus making the total storage about 28 billion cubic feet. Errol dam is located about 5 miles below the outlet of Umbagog Lake and about 3.5 miles below the mouth of Magalloway River, thus making this latter stream one of the feeders of Umbagog Lake.

Accuracy.—The discharge is derived from coefficients applied to the various gate openings as determined from a number of current meter gagings. The ratings, however, are not as thorough as could be desired, and the results are considered very roughly approximate.

Cooperation.—Records are obtained and computations of daily discharge made under the direction of Mr. Walter H. Sawyer, agent for Union Water Power Co., who furnished data to the survey.

Daily discharge, in second-feet, of Androscoggin River at Errol dam, N. H., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	1,910	1,570	1,940	1,490	1,730	4,930	1,890	1,540	1,390	976
2	1,890	1,570	1,920	1,430	1,740	5,930	1,810	1,670	1,420	1,220
3	1,860	1,570	1,900	1,400	2,360	6,000	1,730	1,660	1,490	1,350
4	1,780	1,620	1,870	1,360	1,930	6,020	1,710	1,660	1,540	1,420
5	1,650	1,640	1,820	1,300	2,350	5,940	1,740	1,660	1,560	1,490
6	1,770	1,670	1,790	1,300	2,460	5,860	1,740	1,670	1,690	1,580
7	1,830	1,740	1,760	1,270	2,470	5,640	1,730	1,670	1,850	1,580
8	1,890	1,710	1,710	1,290	2,470	3,620	1,710	1,680	1,630	1,520
9	1,920	1,710	1,660	1,360	2,330	3,300	1,720	1,680	1,420	1,500
10	1,800	1,770	1,590	1,360	2,160	4,390	1,690	1,700	1,360	1,660
11	1,810	1,840	1,560	1,360	2,300	4,310	1,690	1,530	1,320	1,720
12	1,790	1,820	1,510	1,340	2,181	3,770	1,690	1,290	1,450	1,680
13	1,690	1,840	1,500	1,330	2,070	3,760	1,690	1,220	1,410	1,640
14	1,640	1,840	1,500	1,330	1,700	3,760	1,690	1,470	1,580	1,360
15	1,660	1,840	1,510	1,330	2,250	3,210	1,640	1,570	1,620	1,190
16	1,540	1,840	1,540	1,330	2,320	2,560	1,600	1,530	1,330	1,110
17	1,520	1,840	1,540	1,540	2,300	2,280	1,660	1,250	1,590	1,110
18	1,580	1,820	1,540	2,010	2,070	2,160	1,720	1,440	1,600	1,160
19	1,570	1,800	1,510	2,350	1,680	2,070	1,690	1,440	1,550	1,280
20	1,540	1,800	1,470	2,020	2,200	1,880	1,680	1,400	1,120	1,220

Daily discharge, in second-feet, of Androscoggin River at Errol dam, N. H., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
21	1,520	1,800	1,450	1,860	1,750	1,850	1,650	1,330	1,030	1,440
22	1,520	1,800	1,400	1,990	2,110	1,820	1,400	1,300	1,150	1,340
23	1,490	1,800	1,390	2,060	2,230	1,820	1,510	1,270	1,420	1,340
24	1,470	1,820	1,360	2,230	2,220	1,800	1,660	1,200	1,770	1,340
25	1,450	1,840	1,320	1,790	1,980	1,770	1,760	1,250	1,900	1,350
26	1,490	1,870	1,300	1,240	1,660	1,810	1,740	1,050	1,720	1,730
27	1,490	1,900	1,390	1,280	2,270	1,830	1,700	1,160	1,600	1,580
28	1,490	1,920	1,460	1,850	2,360	1,840	1,650	1,000	1,550	1,440
29	1,490	1,940	1,460	2,420	2,380	1,850	1,640	1,240	1,550	1,420
30	1,540	....	1,490	2,010	2,380	1,890	1,650	1,320	1,290	1,390
31	1,570	....	1,490	....	3,300	....	1,540	1,410	....	1,440

Monthly discharge of Androscoggin River at Errol dam, N. H., for 1912.

[Drainage area, 1,095 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	1,920	1,450	1,650	1.51	1.74
February	1,940	1,570	1,780	1.63	1.76
March	1,940	1,300	1,570	1.43	1.65
April	2,420	1,240	1,610	1.47	1.64
May	3,300	1,660	2,180	1.99	2.29
June	6,020	1,770	3,320	3.03	3.38
July	1,890	1,400	1,680	1.53	1.76
August	1,700	1,000	1,430	1.31	1.51
September	1,900	1,030	1,500	1.37	1.53
October	1,730	976	1,410	1.29	1.49
November	....	....	[a] 1,450	1.32	1.47
December	....	....	[a] 1,450	1.32	1.52
The year	6,020	....	1,750	1.60	21.74

[a] Estimated from probable discharge at the Ponticook dam (about 18 miles below), which is used as a regulating dam for the mills of Berlin, N. H.

ANDROSCOGGIN RIVER AT RUMFORD FALLS, MAINE.

Location.—Dam of the Rumford Falls Power Co., at Rumford Falls.

Records available.—May 18, 1892, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—2,090 square miles.

Gage.—One located in pond above dam and one in tailrace of power house.

Discharge.—Computed from discharge over the dam, using the customary Francis weir formula with modified coefficient, and the quantities passing through the various wheels of the power house, which have been thoroughly rated.

Winter flow.—Little affected by ice.

Artificial control.—The storage in the Rangeley system of lakes at the headwaters of Androscoggin River, aggregating 28,000,000,000 cubic feet, is largely under complete control. The stored water is regulated in the interests of the water-power users below and is under such excellent management that this is one of the best water-power streams in the country.

Accuracy.—Results are believed to be excellent.

Cooperation.—Records are obtained and computations made by Mr. Charles A. Mixer, engineer Rumford Falls Power Co., who furnishes the data through the district office.

Daily discharge, in second-feet, of Androscoggin River at Rumford Falls, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,670	2,200	2,420	3,700	6,120	9,150	2,110	1,980	[a]1,480	2,600	2,670	[a]1,720
2	2,840	2,210	2,390	3,490	5,950	[a]9,080	2,190	2,240	1,600	2,630	3,130	2,250
3	2,780	2,180	[a]2,370	3,210	5,180	9,090	2,230	2,310	1,840	2,540	[a]3,150	4,030
4	2,820	[a]2,140	2,450	3,000	5,190	9,080	2,160	[a]2,460	1,880	2,360	2,860	3,990
5	2,780	2,090	2,470	2,950	[a]4,650	8,250	2,090	2,550	1,880	2,300	2,550	3,520
6	2,270	2,220	2,450	3,350	5,180	7,720	2,090	2,220	1,910	[a]2.020	2,490	3,540
7	[a]2,660	2,240	2,370	[a]6,020	6,030	6,750	[a]1,740	2,110	1,950	2,180	2,740	4,660
8	2,340	2,220	2,260	11,200	5,930	6,520	2,150	2,070	[a]1,960	2,180	9,170	[a]3,560
9	2,430	2,260	2,330	7,870	5,960	[a]5,480	2,060	2,070	2,020	2,250	5,560	2,600
10	2,360	2,200	[a]2,270	5,110	6,320	3,830	1,990	2,060	1,960	2,060	[a]3,900	2,760
11	2,290	[a]2,150	2,210	5,280	5,990	4,710	2,040	[a]2,430	1,760	2,140	3.590	3,150
12	2,190	2,200	2,280	5,500	[a]5,120	4,770	1,940	3,920	2,110	2,050	3,170	2,820
13	2,130	2,400	2,260	5,710	6,440	4,410	1,830	3,180	1,950	[a]1,930	2,850	2,240
14	[a]2,180	2,310	2,320	[a]5,930	7,140	4,060	[a]1,590	2,520	1,940	2,180	2,880	2,450
15	2,260	2,320	2,340	6,690	5,630	4,020	2,110	2,560	[a]1,910	2,180	2,900	[a]2,520
16	2,360	2,360	2,440	12,100	4,850	[a]3,530	2,020	2,400	2,730	1,990	2,780	3,150
17	2,130	2,350	[a]2,570	17,000	7,110	3,410	1,930	2,280	2,780	2,020	[a]2,510	2,820
18	2,210	[a]2,340	2,840	13,900	7,090	3,130	1,930	[a]2,000	2,540	1,880	2,790	2,790
19	2,320	2,320	2,950	11,100	[a]5,540	2,830	2,000	2,060	2,370	1,900	2,740	2,990
20	2,300	2,360	3,200	9,590	4,420	2,730	2,060	2,110	4,170	[a]1,850	2,750	3,010
21	[a]2,260	2,360	2,960	[a]8,480	4,870	2,650	[a]1,650	1,940	4,740	1,960	2,760	2,500
22	2,230	2,370	2,810	8,920	5,590	2,590	2,240	1,930	[a]3,170	2,000	2,820	[a]2,120
23	2,260	2,390	2,770	12,800	4,700	[a]1,880	2,190	1,970	2,980	1,930	3,050	2,470
24	2,240	2,420	[a]2,660	12,100	4,440	2,200	1,800	1,960	2,540	5,450	[a]2,610	2,410
25	2,230	[a]2,390	2,550	8,810	4,770	2,320	1,920	[a]1,970	2,510	12,840	2,970	1,760
26	2,180	2,360	2,530	8,400	[a]4,270	2,060	1,920	2,280	2,540	8,450	2,740	2,190
27	2,140	2,460	2,450	8,440	3,400	2,110	1,870	2,280	2,490	[a]5,310	2,670	2,380
28	[a]2,070	2,390	2,430	[a]8,580	3,340	2,110	[a]1,600	2,170	2,410	4,150	2,620	2,240
29	2,060	2,350	2,720	7,000	3,590	2,120	1,920	1,980	[a]1,930	3,760	2,400	[a]2,220
30	2,070	....	3,520	6,330	6,450	[a]1,840	1,990	1,850	2,680	2,820	2,380	2,700
31	2,150	....	[a]3,540	....	8,330	....	1,900	1,770	....	2,730	....	2,870

[a] Sunday.

Monthly discharge of Androscoggin River at Rumford Falls, Maine, for 1912.

[Drainage area, 2,090 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,840	2,060	2,330	1.11	1.28
February	2,460	2,090	2,300	1.10	1.19
March	3,540	2,210	2,580	1.23	1.42
April	17,000	2,950	7,750	3.71	4.14
May	8,330	3,340	5,470	2.62	3.02
June	9,150	1,840	4,480	2.14	2.39
July	2,240	1,590	1,980	.947	1.09
August	3,920	1,770	2,250	1.08	1.24
September	4,740	1,480	2,360	1.13	1.26
October	12,840	1,850	3,050	1.46	1.68
November	9,170	2,400	3,150	1.51	1.68
December	4,660	1,720	2,790	1.34	1.54
The year	17,000	1,480	3,370	1.61	21.93

PRESUMPSCOT RIVER BASIN.

PRESUMPSCOT RIVER AT OUTLET OF SEBAGO LAKE, MAINE.

Location.—Outlet dam at Sebago Lake and the hydroelectric plant at Eel Weir Falls, 1 mile below lake outlet.

Records available.—January 1, 1887, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission, in the second of which reports are published results of a recomputation of all data from 1887 to 1911.

Drainage area.—436 square miles.

Gages.—On the bulkhead of the gatehouse at the outlet dam and in the fore bay and tailrace of the power plant.

Discharge.—Prior to March, 1904, the discharge was deduced from the records of the opening of the gates in the dam, the discharge capacity of which under different conditions of head has been determined and tabulated by Mr. Hiram F. Mills, of Lowell.

In March, 1904, a hydroelectric plant was completed at Eel Weir Falls, the water being brought directly from the outlet dam to the plant by means of a canal about a mile long. This new plant has necessitated a different method of recording the flow from the lake. The water passes through three pairs of 30-inch Hercules wheels, the amount being recorded by three Allen meters, one on each pair. These meters were rated by the result of a test at Holyoke, Mass., of one pair of wheels. Since the station was finished the performance of the wheels and of the recording meters has been checked by current-meter measurements, brake tests of the wheels, and electrical readings of the generator output. It is usually desired to keep a constant flow through the canal, and when demands for power are not sufficient to utilize the entire flow through the wheels, the excess of water is run off through a pair of regulating gates at the power station. A record of the opening of these gates is kept and the flow computed from a coefficient determined from current-meter tests.

At times the flow from the lake may be greater than is safe to carry through the canal, though this has not yet happened. At such times it will be necessary to draw a part of the water through the old regulating gates in the main dam.

Winter flow.—No trouble from ice.

Artificial control.—Sebago Lake, with an area of 46 square miles, is under complete control for storage. It is a magnificent natural storage reservoir and its utilization for this purpose has made the flow of the Presumpscot extremely regular.

Accuracy.—Results very good for a station of this type.

Cooperation.—Records obtained and computations of daily discharge made and furnished by the S. D. Warren Co.

Daily discharge, in second-feet, of Presumpscot River at outlet of Sebago Lake, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	542	542	542	310	537	287	537	593	[a] 308	660	678	[a] 238
2	538	543	528	353	535	[a] 180	535	595	667	673	675	680
3	542	535	[a] 208	330	533	465	538	585	667	675	[a] 230	682
4	543	[a] 188	537	423	537	535	188	[a] 310	667	670	670	678
5	542	540	538	428	[a] 168	537	542	577	667	665	667	682
6	532	538	543	378	518	537	532	607	667	[a] 228	670	682
7	[a] 187	537	533	[a] 107	535	537	[a] 188	607	667	670	672	628
8	538	538	532	145	537	532	535	607	[a] 317	667	668	[a] 233
9	540	542	535	270	535	[a] 290	537	605	667	670	663	813
10	542	538	[a] 202	240	533	533	533	605	667	662	[a] 248	817

[a] Sundays.

Daily discharge, in second-feet, of Presumpscot River at outlet of Sebago Lake, Maine, for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	540	a 215	533	288	495	535	538	a 342	667	670	668	820
12	540	538	530	418	a 185	535	543	600	667	662	675	808
13	533	538	357	307	532	535	538	600	667	a 230	672	812
14	a 228	537	272	a 112	540	533	a 185	598	667	665	668	808
15	537	537	302	333	535	532	542	603	a 298	648	652	a 248
16	542	535	225	398	490	a 185	538	600	650	668	547	818
17	545	530	a 33	357	422	537	535	603	658	663	a 228	823
18	545	a 192	203	362	412	537	532	a 328	667	657	675	820
19	543	535	203	298	a 187	538	538	595	658	630	648	685
20	538	535	203	285	533	537	532	595	658	a 322	677	633
21	a 182	547	260	a 238	537	538	a 190	595	658	670	680	808
22	540	483	340	373	537	533	540	602	a 222	673	672	a 238
23	540	518	408	452	535	a 193	535	595	667	665	670	815
24	543	515	a 110	433	535	537	535	592	658	667	a 245	765
25	542	a 188	440	458	535	535	533	a 312	667	650	587	672
26	540	528	465	490	a 223	538	532	663	658	665	643	813
27	530	537	502	503	535	535	538	660	667	a 227	672	810
28	a 203	537	496	a 193	535	537	a 343	667	658	678	590	822
29	540	537	233	543	530	535	583	663	a 298	667	663	a 402
30	545	....	150	538	435	a 213	598	663	663	675	673	772
31	545	....	a 135	....	317	....	593	658	....	665	....	686

a Sunday.

Monthly discharge of Presumpscot River at outlet of Sebago Lake, Maine, for 1912.

[Drainage area, 436 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	545	182	496	1.14	1.31
February	547	188	487	1.12	1.21
March	543	33	358	.821	.95
April	543	107	345	.791	.88
May	540	168	469	1.08	1.24
June	538	180	471	1.08	1.20
July	598	185	491	1.13	1.30
August	667	310	575	1.32	1.52
September	667	222	601	1.38	1.54
October	678	223	611	1.40	1.61
November	680	228	601	1.38	1.54
December	823	233	678	1.56	1.80
The year	823	33	516	1.18	16.10

SACO RIVER BASIN.

SACO RIVER NEAR CENTER CONWAY, N. H.

Location.—At the wooden highway bridge between Center Conway and Redstone, N. H., about 2 miles from each place, about 3 miles below the mouth of Swift River, and 2 miles above the outlet of Conway Lake.

Records available.—August 26, 1903, to June 30, 1912. Data also in annual reports of the Maine State Water Storage Commission.

Drainage area.—385 square miles.

Gage.—Chain attached to bridge; datum unchanged.

Channel.—Recent measurements indicate radical changes in conditions of flow; but insufficient measurements have been taken to define the new discharge rating curve. Channel broken by one pier.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—So affected by ice that gage-height observations are discontinued.

Daily gage height, in feet, of Saco River near Center Conway, N. H., for 1912.

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1	......	5.70	6.06	11	5.29	5.65	3.95	21	6.36	5.77	3.23
2	4.68	5.66	5.24	12	5.26	5.36	3.84	22	6.48	5.97	3.18
3	4.46	5.32	5.12	13	5.36	7.09	3.78	23	9.18	5.43	3.12
4	4.17	5.38	5.02	14	5.62	7.62	3.67	24	7.24	5.19	3.07
5	4.03	5.28	4.61	15	5.58	5.82	3.54	25	6.48	5.20	3.05
6	5.18	5.48	4.38	16	7.21	5.32	3.48	26	6.42	4.88	2.98
7	5.99	5.52	4.42	17	8.73	7.36	3.69	27	6.78	4.61	2.94
8	7.85	5.84	4.24	18	7.83	6.56	3.56	28	6.82	4.43	2.88
9	6.08	5.58	4.04	19	7.18	5.71	3.38	29	6.00	4.29	2.82
10	5.49	5.71	3.94	20	6.64	5.36	3.29	30	5.70	6.36	2.78
								31	......	6.28	......

SACO RIVER AT WEST BUXTON, MAINE.

Location.—At hydroelectric plant of the Portland Electric Co. at West Buxton, Maine.

Records available.—October 19, 1907, to December 31, 1912. Data also in annual reports Maine State Water Storage Commission.

Drainage area.—1,550 square miles.

Gages.—One in pond above dam and one in tailrace of power house.

Channel.—Crest of the concrete dam, about 300 feet long.

Discharge.—The flow over the dam and through the rated wheels of the power plant is determined by means of gage readings taken every hour.

Winter flow.—No trouble from ice.

Artificial control.—There are dams on numerous although comparatively small lakes in the basin above the station. Regulation of storage probably has some effect on the regimen of the stream but not to the extent that obtains in the other basins in the State of Maine, where natural storage facilities are better and more fully developed.

Accuracy.—Results believed to be good for a station of this type.

Cooperation.—Records obtained and computations of daily discharge made and furnished by the Cumberland County Power & Light Co.

Daily discharge, in second-feet, of Saco River at West Buxton, Maine, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,210	1,330	1,170	8,020	8,660	6,300	1,390	1,170	[a]838	1,590	3,640	[a]1,300
2	1,610	1,300	1,080	7,960	8,010	[a]5,910	1,370	1,180	822	1,430	3,640	1,840
3	1,430	1,260	[a]505	7,760	7,420	6,540	1,290	1,300	1,110	1,300	[a]3,140	1,680
4	1,400	[a]880	1,310	8,080	6,770	6,150	1,120	[a]1,180	1,090	1,260	3,470	1,820
5	1,530	1,480	1,190	7,300	[a]5,560	5,770	1,190	1,150	1,060	1,010	3,230	1,920
6	1,260	1,380	1,230	7,140	6,020	5,460	1,400	1,430	1,040	[a]912	3,010	2,000
7	[a]774	1,250	1,120	[a]8,920	5,680	5,150	[a]924	1,330	950	1,320	2,970	2,280
8	1,330	1,250	1,150	10,500	5,650	4,680	1,370	1,620	[a]851	1,360	3,200	[a]2,070
9	1,340	1,180	1,130	10,300	5,440	[a]3,990	1,470	1,240	1,000	1,320	3,720	2,540
10	1,750	1,020	[a]633	8,670	5,920	4,140	1,410	912	1,020	1,150	[a]3,950	2,180
11	1,690	[a]707	1,140	8,920	5,630	3,720	1,400	[a]1,100	905	1,280	4,580	2,230
12	1,480	1,340	999	8,910	[a]5,020	3,390	1,460	1,240	1,070	1,120	4,660	2,160
13	1,100	1,120	1,180	8,810	5,410	3,240	1,220	1,160	903	[a]847	4,610	1,960
14	[a]801	1,030	1,460	[a]8,750	5,390	3,010	[a]1,090	1,680	828	1,170	4,580	1,620
15	1,170	1,030	2,430	8,980	5,540	2,690	1,410	2,160	[a]557	1,080	4,380	[a]1,170
16	1,330	1,090	3,660	8,830	5,670	[a]2,320	1,500	1,970	945	918	3,700	1,700
17	1,220	956	[a]4,440	9,370	6,280	3,480	1,390	1,920	969	915	[a]1,560	1,680
18	1,260	[a]683	4,460	9,710	6,590	2,540	1,360	[a]1,450	779	904	2,920	1,860
19	1,290	1,180	4,420	11,400	[a]6,340	3,050	1,420	2,060	840	866	2,530	1,800
20	1,230	1,130	5,030	13,000	6,780	2,800	1,180	1,850	848	[a]690	2,340	1,980
21	[a]1,030	1,040	5,290	[a]12,600	6,630	2,600	[a]1,010	1,650	840	956	2,210	1,880
22	1,610	870	5,070	12,400	6,810	2,800	1,200	1,360	[a]789	1,020	2,040	[a]1,440
23	1,580	938	4,740	11,900	6,550	[a]1,730	1,320	1,330	1,710	1,100	1,910	1,800
24	1,540	934	[a]4,260	11,200	6,560	2,370	1,280	1,360	1,960	974	[a]1,430	1,620
25	1,440	[a]721	4,280	11,200	6,430	2,040	1,430	[a]1,120	2,010	1,310	2,100	1,030
26	1,540	1,420	4,020	11,100	[a]5,810	1,940	1,420	1,350	1,840	2,430	1,970	1,540
27	1,520	1,260	3,860	10,800	5,870	1,870	1,100	1,320	1,840	[a]2,880	1,980	1,500
28	[a]1,280	1,250	3,710	[a]9,920	5,360	1,620	[a]620	1,250	1,360	3,580	1,400	1,620
29	1,740	1,200	4,630	10,100	4,850	1,470	701	1,300	[a]1,250	3,590	1,930	[a]1,740
30	1,620	....	6,200	8,970	5,220	[a]875	780	1,170	1,690	3,770	1,690	2,330
31	1,520	....	[a]7,440	....	5,890	....	888	978	....	3,930	....	2,440

[a] Sunday.

Monthly discharge of Saco River at West Buxton, Maine, for 1912.

[Drainage area 1,550 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	1,750	774	1,380	0.890	1.03
February	1,480	683	1,110	.716	.77
March	7,440	505	3,010	1.94	2.24
April	13,000	7,140	9,720	6.27	7.00
May	8,660	4,850	6,120	3.95	4.55
June	6,540	875	3,450	2.23	2.49
July	1,500	620	1,230	.794	.92
August	2,160	912	1,400	.903	1.04
September	2,010	557	1,120	.723	.81
October	3,930	690	1,550	1.00	1.15
November	4,660	1,400	2,950	1.90	2.12
December	2,540	1,030	1,830	1.18	1.36
The year	13,000	505	2,900	1.87	25.48

MERRIMAC RIVER BASIN.

MIDDLE BRANCH OF PEMIGEWASSET RIVER AT NORTH WOODSTOCK, N. H.

Location.—At a dam about half a mile upstream from the North Woodstock post office.

Records available.—September 18, 1911, to October 31, 1912.

Drainage area.—28.6 square miles.

Gage.—Vertical staff, attached to wall of forebay, near the racks; an automatic gage was set on a shelf over the forebay April 4 to October 31, 1912.

Channel.—Gage heights at this station indicate the head on the crest of the spillway at the dam. The spillway is 110.85 feet long and has an ogee section. The crest is comparatively level, having a mean gage height of 0.1 foot. The dam is constructed for the installation of two wheels, neither of which has yet been put in. There is no leakage through the dam or through the unfinished penstocks.

Discharge measurements.—Made by wading below the dam.

Winter flow.—The crest of the dam was cleared of ice before the gage heights were obtained, so that open water prevailed for the entire period of the record.

Accuracy.—Estimates for the extreme low flow at this station are good. No measurements were made at the high stages to check up a coefficient for the spillway.

Cooperation.—Maintained in cooperation with the Department of Agriculture in connection with the intensive studies for the acquisition of lands for the protection of watersheds of navigable streams.

Discharge measurements of Middle Branch of Pemigewasset River at North Woodstock, N. H., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 26	C. R. Adams	[a]0.31	27.2
Feb. 1	R. J. Coffin	[a].28	20.5
15	....do	[a].23	16.5
20	....do	[a].24	15.6
Mar. 7	R. A. Smead	[b].20	14.4

[a] 34 feet of spillway at east end completely blocked off by ice.

[b] Entire length of spillway clear.

Daily gage height, in feet, and discharge, in second-feet, of Middle Branch of Pemigewasset River at North Woodstock, N. H., for 1911.

[L. M. Watchie, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	......	......	0.47	89	0.49	96	0.53	111
2	......	......	.56	122	.44	79	.48	92
3	......	......	.50	99	.41	68	.42	72
4	......	......	.89	275	.38	59	.37	56
5	......	......	.92	291	.37	56	.37	56
6	......	......	.66	164	.36	53	.48	92
7	......	......	.60	138	.73	196	.48	92
8	......	......	.52	107	.77	216	.42	72
9	......	......	.47	89	.50	99	.39	62
10	......	......	.42	72	.43	75	.40	65
11	......	......	.42	72	.43	75	.46	85
12	......	......	.40	65	.41	68	.74	201
13	......	......	.37	56	.91	285	1.19	444
14	......	......	.36	53	.58	130	.79	225
15	......	......	.34	48	.52	107	.62	147
16	......	......	.33	45	.48	92	.56	122
17	......	......	.32	42	.44	79	.50	99
18	0.41	68	.36	53	.47	89	.48	92
19	.37	56	1.22	463	.52	107	.44	79
20	.34	48	.70	182	.46	85	.39	62
21	.32	42	.55	118	.43	75	.40	65
22	.44	79	.62	147	.40	65	.40	65
23	.37	56	1.33	532	.38	59	1.38	565
24	.34	48	.71	187	.40	65	.76	211
25	.32	42	.57	126	.39	62	.62	147
26	.41	68	.51	103	.38	59	.53	111
27	.38	59	.49	96	.36	53	.50	99
28	.44	79	.47	89	.34	48	.42	72
29	.39	62	.43	75	.97	317	.40	65
30	.55	118	.41	68	.68	173	.38	59
31	......	......	.40	65	......	......	.38	59

NOTE.—Gage heights read from a staff Jan. 1 to Mar. 31, 1912. The spillway cleared of all obstruction prior to taking of observation, Jan. 1 to Jan. 11, inclusive. Fourteen feet of spillway at east end completely shut off by ice when observation was taken Jan. 12 to 25, inclusive. Thirty-four feet of spillway at east end completely shut off by ice when gage height was taken Jan. 26 to Feb. 26, inclusive. Spillway was entirely open when gage height was taken from Feb. 27 to Oct. 31, inclusive. Mean gage height, Apr. 4 to Oct. 31, taken from automatic record. Days of no record caused by automatic gage stopping.

Daily gage height, in feet, of Middle Branch of Pemigewasset River at North Woodstock, N. H., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	0.38	0.28	0.21	......	0.82	0.94	0.25	0.26	0.30	0.49
2	.35	.28	.21	......	.80	.76	.24	.27	.35	.43
3	.34	.27	.21	......	......	.90	.25	.42	.42	.39
4	.34	......	.20	0.43	......	.77	.23	.46	.41	.37
5	.34	.27	.20	.40	.80	.66	.22	.36	.36	.34
6	.29	.26	.20	.40	1.02	.62	.21	.28	.40	.34
7	.29	.26	.20	1.00	1.01	.67	.21	.27	.40	.33
8	......	.26	.20	1.30	.98	.60	.20	.26	......	.32
9	.30	.25	.20	.91	.90	.56	.21	.24	......	.30
10	.31	.26	......	.75	1.01	.51	.20	.23	......	......
11	.29	......	......	.68	.93	.49	.28	1.17	......	......
12	.29	.26	......	.71	1.00	.48	.22	.83	......	......
13	.30	.26	......	1.13	1.5	.47	.22	.54	......	.50
14	.30	.26	......	1.20	1.40	.43	.21	.42	......	.40
15	.29	.24	......	......	.89	.39	.22	.47	......	.36

Daily gage height, in feet, of Middle Branch of Pemigewasset River at North Woodstock, N. H., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
16	.28	.23	......	......	.87	.41	.22	.53	.55	.33
17	.28	.23	......	......	1.15	.60	.22	.42	.41	.32
18	.28	.23	......	......	.89	.49	.23	.40	.36	.33
19	.27	.23	......	......	.75	.43	.23	.38	.32	.35
20	.30	.23	......	......	.71	.39	.23	.36	.45	.38
21	.33	.22	......	.91	1.02	.38	.31	.31	.60	.37
22	.30	.27	......	1.06	.92	.35	.45	......	.45	.36
23	.29	.28	......	1.86	.81	.32	.35	......	.40	.89
24	.28	.27	......	1.10	.78	.32	.25	......	.38	1.59
25	.27	.32	......	1.00	.80	.32	.23	......	.33	1.10
26	.30	.32	......	1.05	.70	.30	.21	......	.31	.79
27	.30	.23	......	......	.62	.30	.20	.40	.31	.66
28	.30	.23	......	......	.58	.30	.21	.33	.32	.55
29	.29	.23	.70	.82	.73	.30	.21	.30	.35	.50
30	.29	......	.60	.80	1.22	.28	.20	.29	.04	.44
31	.29	......	......	......	1.04	......	.20	.30	......	......

Daily discharge, in second-feet, of Middle Branch of Pemigewasset River at North Woodstock, N. H., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	59	23	15	......	240	301	24	27	36	96
2	50	23	15	......	230	211	22	29	50	75
3	48	21	15	......	230	280	24	72	72	62
4	48	21	13	75	230	216	20	85	68	56
5	48	21	13	65	230	164	18	53	53	48
6	34	20	13	65	344	147	15	31	65	48
7	34	20	13	333	339	169	15	29	65	45
8	35	20	13	513	322	138	13	27	......	42
9	36	18	13	285	280	122	15	22	......	26
10	39	20	......	206	339	103	13	20	......	......
11	34	20	......	173	296	96	31	432	......	......
12	30	20	......	187	333	92	18	215	......	......
13	31	20	......	408	646	89	18	115	......	99
14	31	20	......	450	578	75	15	72	......	65
15	30	16	......	......	275	62	18	89	......	58
16	27	15	......	......	265	68	18	111	118	45
17	27	15	......	......	420	138	18	72	68	42
18	27	15	......	......	275	96	20	65	53	45
19	25	15	......	......	206	75	20	59	42	50
20	31	15	......	......	187	62	20	53	82	59
21	39	13	......	285	344	59	39	39	138	56
22	31	21	......	367	291	50	82	......	82	53
23	30	23	......	910	235	42	50	......	65	275
24	27	21	......	390	220	42	24	......	59	709
25	25	30	......	333	230	42	20	......	45	390
26	26	30	......	361	192	36	15	......	39	225
27	26	20	......	450	147	36	13	65	39	164
28	26	20	......	333	130	36	15	45	42	118
29	24	20	182	240	196	36	15	36	50	99
30	24	......	138	230	463	31	13	34	156	79
31	24	......	......	......	356	......	13	36	......	......

NOTE.—Daily discharge determined from rating curve computed by using a coefficient of 3.50 in the formula $Q=CHL^{\frac{3}{2}}$.

Monthly discharge of Middle Branch of Pemigewasset River at North Woodstock, N. H., for 1911–12.

[Drainage area, 28.6 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
September 18–30	118	42	63.5	2.22	1.07	A.
October	532	42	133	4.65	5.36	A.
November	285	48	103	3.60	4.02	A.
December	565	56	124	4.34	5.00	A.
1912.						
January	59	24	33.1	1.16	1.34	A.
February	30	13	20.1	.703	.76	A.
March 1–9, 29–30	182	13	40.3	1.41	.57	C.
April	910	65	292	10.2	11.4	B.
May	646	130	292	10.2	11.8	B.
June	301	31	104	3.64	4.06	B.
July	82	13	21.7	.759	.88	A.
August	432	20	71.4	2.50	2.88	B.
September	138	36	74.1	2.59	2.89	B.
October	709	36	111	3.89	4.34	B.

NOTE.—Discharge for periods for which gage records are missing determined by interpolation and by use of climatologic data.

PEMIGEWASSET RIVER AT PLYMOUTH, N. H.

Location.—In the town of Plymouth, about 40 feet above the covered wooden highway bridge three-fourths of a mile below the mouth of Bakers River.

Records available.—1886 to December 31, 1912.

Drainage area.—615 square miles.

Gages.—Two gages have been maintained at this station. From September 4, 1903, to June 30, 1907, readings were taken with the chain gage established by the United States Geological Survey on the upstream side of the bridge; the datum of this gage has remained the same during the maintenance of the station. Since June 30, 1907, gage heights have been furnished by the Locks & Canals Co., of Lowell, Mass., from readings taken on the staff gage, the low and medium stage sections of which are about 40 feet above the bridge and on the same side of the river as the chain gage. The high-stage section is bolted to the upstream side of the right abutment; the datum of this gage is 1.11 feet higher than that of the chain gage. All gage readings prior to 1910 were reduced to chain-gage datum. At low stages the difference in readings between the two gages is 1.11 feet; at 8.1 feet on the staff gage the difference is 0.99 feet. Owing to the slight difference in the relation of stage to discharge at the locations of the two gages and to the fact that gage readings are now taken on the staff gage, it is considered advisable to publish all gage heights beginning with 1910 exactly as received from the Locks & Canals Co., namely, as referred to the staff-gage datum.

Channel.—Rocky and probably fairly permanent in the right channel; fine gravel, shifting occasionally at times of high floods, in the left channel.

Discharge measurements.—Made from the bridge at ordinary and high stages. At low stages the right channel is measured from the bridge and the left channel by wading.

Artificial control.—The nearest dam upstream is at the pulp mills at Livermore Falls, 3 miles above; downstream the nearest dam is at Franklin, 25 miles distant. The control of the flow at Livermore Falls and also at the dam at Woodstock, 17 miles upstream, affects the low-water discharge slightly.

Winter flow.—Affected by ice, which forms on the control about 300 feet below the bridge. Discharge from sewer entering a short distance above the gage usually keeps the river open on right bank near the staff gage.

Accuracy.—Estimates of discharge covering the period from 1886–1903 were made and published in Water-Supply Paper 124, pages 97–101. At the time these estimates were published it was believed that conditions of flow were stable, but two quite radical changes have since occurred, one in 1905 and one in 1910, the discharge at a stage of 1.2 feet (chain gage) having varied as follows: 1904, discharge 110 second-feet; 1905, discharge 158 second-feet; 1910, discharge 213 second-feet. Hence, these earlier estimates of discharge should be used with caution for low stages, although they are probably essentially correct for medium and high stages. For the period since 1903 good discharge rating curves have been developed. Conditions for obtaining accurate discharge data are good, except at low stages, when the control of the flow at Livermore Falls affects the accuracy of the computed values of daily discharge.

Cooperation.—Gage heights since June 30, 1907, furnished by the Locks & Canals Co., of Lowell, Mass.

Discharge measurements of Pemigewasset River at Plymouth, N. H., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 27	Coffin and Moore	[a] 1.90	349	Feb. 18	C. R. Adams	[a] 1.60	291
29	R. J. Coffin	[a] 1.80	355	28	Adams and Coffin	[a] 1.90	290
29	Adams and Coffin	[a] 1.81	374	Mar. 6	.....do	[a] 1.82	293
Feb. 3	.....do	[a] 1.74	343	12	Smead and Moore	[a] 1.70	304
12	.....do	[a] 1.58	260	Apr. 19	C. R. Adams	5.90	6,160

[a] Relation of gage height to discharge affected by ice.

NOTE.—All gage heights refer to staff gage.

Daily gage height, in feet, of Pemigewasset River at Plymouth, N. H., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	1.8	1.8	5.8	3.1	4.9	0.42	0.38	......	1.5	1.8	......
2	2.5	1.9	1.8	6.2	2.9	......	.38	.5	0.7	1.1	3.3	1.25
3	2.5	1.8	......	6.0	2.8	3.7	.35	.85	.9	.95	......	2.8
4	2.3	......	1.8	3.6	2.7	2.9	.33	......	.85	.9	1.9	2.5
5	2.2	1.7	1.7	2.7	......	2.4	.29	.9	.9	.9	1.6	2.4
6	2.4	1.7	1.8	4.3	2.7	2.1	.25	.85	.9	......	1.5	2.6
7	......	1.7	1.8	6.5	3.8	2.5	......	.6	.7	.75	1.4	3.4
8	2.2	1.7	1.8	10.6	3.8	2.0	.25	.46	......	.75	8.6	......
9	2.2	1.7	1.8	5.3	3.4	......	.29	.42	.6	.8	5.5	1.9
10	2.5	1.6	......	4.1	3.2	1.5	.25	.42	.6	.7	......	1.8
11	2.4	......	1.7	3.6	3.4	1.5	.21	5.5	.55	.75	2.8	1.75
12	2.2	1.15	1.7	3.6	......	1.5	.21	4.2	.5	.9	2.5	1.6
13	2.1	1.6	1.8	3.9	4.3	1.4	.19	2.3	.5	......	2.2	1.6
14	......	1.6	2.1	......	6.2	1.3	......	1.5	.5	1.35	2.2	1.4
15	2.0	1.6	2.2	3.8	3.8	1.2	.25	1.1	......	1.1	2.8	......
16	2.1	1.6	2.9	6.1	3.0	......	.29	1.0	.6	1.1	2.5	1.3
17	1.9	1.6	......	9.1	4.6	1.25	.29	.8	1.3	1.1	......	1.25
18	1.9	......	4.2	7.6	4.1	1.5	.25	......	1.1	.95	2.0	1.25
19	1.8	1.6	4.0	6.4	......	1.2	.33	.7	.9	1.0	1.8	1.45
20	6.0	1.7	4.3	5.5	2.8	1.1	.27	.75	.9	......	1.7	2.6
21	......	1.7	4.5	......	3.5	1.0	......	.6	2.5	1.05	1.5	2.4
22	2.4	1.8	3.8	5.0	4.5	.9	.65	.5	......	.85	1.4	......
23	2.3	1.9	3.2	9.1	3.8	......	1.1	.55	1.35	1.35	1.45	2.3
24	2.2	1.9	......	6.6	3.2	.65	.55	.6	1.2	6.7	......	2.0
25	2.2	......	2.7	4.5	3.2	.6	.5	......	1.05	8.6	1.6	1.9
26	2.0	1.8	2.5	4.2	......	.7	.42	.55	.85	5.3	1.5	1.6
27	1.9	1.9	2.3	4.8	2.4	.6	.42	.9	.75	......	1.45	1.3
28	......	1.9	2.3	......	2.3	.55	......	1.05	.7	3.1	1.4	1.3
29	1.8	1.8	2.6	3.8	1.8	.5	.38	.85	......	2.4	1.4	......
30	1.8	......	6.5	3.3	3.6	......	.33	.6	1.35	2.0	1.4	1.5
31	1.9	......	......	......	4.9	......	.33	.6	......	1.9	......	2.6

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 31.

Daily discharge, in second-feet, of Pemigewasset River at Plymouth, N. H., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		375	290	6,320	2,560	4,910	339	322	452	1,020	1,260	890
2		425	290	7,000	2,330	4,080	322	375	480	730	2,780	835
3		343	290	6,660	2,230	3,260	309	570	600	632	2,060	2,230
4		340	290	3,140	2,120	2,340	300	585	570	600	1,350	1,920
5		330	290	2,120	2,120	1,820	284	600	600	600	1,100	1,820
6		330	293	4,050	2,120	1,530	269	570	600	555	1,020	2,020
7		330	375	7,530	3,380	1,920	269	425	480	510	945	2,900
8		330	375	15,800	3,380	1,440	269	357	452	510	11,600	2,120
9		330	375	5,520	2,900	1,230	284	339	425	540	5,840	1,350
10		288	350	3,780	2,660	1,020	269	339	425	480	4,040	1,260
11		288	330	3,140	2,900	1,020	254	5,840	400	510	2,230	1,220
12		260	304	3,140	3,480	1.020	254	3,920	375	600	1,920	1,100
13		288	375	3,520	4,050	945	247	1,720	375	754	1,620	1,100
14		288		3,450	7,000	870	258	1,020	375	908	1,620	945
15		288		3,380	3,380	800	269	730	400	730	2,230	908
16		288		6.830	2,440	818	284	665	425	730	1,920	870
17		288		12.600	4,470	835	284	540	870	730	1,680	835
18		291		9.590	3,780	1,020	269	510	730	632	1,440	835
19		290		7.350	3.000	800	300	480	600	665	1,260	982
20		290		5,840	2,230	730	277	510	600	682	1,180	2,020
21		290		5,450	3.020	665	340	425	1,920	698	1,020	1,820
22		290		5,060	4.330	600	452	375	1,410	570	945	1,770
23		290		12,600	3.380	526	730	400	908	908	982	1,720
24		290		7,710	2,660	452	400	425	800	7,890	1,040	1.440
25		290		4,330	2,660	425	375	412	698	11,600	1,100	1,350
26		290		3,920	2,240	480	339	400	570	5,520	1,020	1,100
27	349	290		4,760	1,820	425	339	600	510	4,040	982	870
28	350	290		4,070	1,720	400	330	698	480	2,560	945	870
29	364	290		3,380	1,260	375	322	570	694	1,820	945	945
30	375			2,780	3,140	357	300	425	908	1,440	945	1,020
31	425				4,910		300	425		1,350		2,020

NOTE.—Daily discharge Jan. 27 to Mar. 13, inclusive, computed by correcting gage heights according to the amount of backwater from ice indicated by discharge measurements made during that period; this effect is so consistent that the discharge values should be good. Discharge interpolated for days on which gage was not read.

Monthly discharge of Pemigewasset River at Plymouth, N. H., for 1912.

[Drainage area, 615 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			1,070	1.74	2.00	D.
February	425	260	307	.499	.54	B.
March			1,410	2.29	2.64	D.
April	15,800	2,120	5,830	9.48	10.58	B.
May	7,000	1,260	3,020	4.91	5.66	B.
June	4,910	357	1,240	2.02	2.25	B.
July	730	247	317	.515	.59	B.
August	5,840	322	825	1.34	1.54	B.
September	1,920	375	638	1.04	1.16	B.
October	11,600	480	1,660	2.70	3.11	B.
November	11,600	945	1,970	3.20	3.57	B.
December	2,900	835	1,390	2.26	2.61	B.
The year	15,800	247	1,640	2.67	36.25	

NOTE. –Mean discharge Jan. 1-26 and Mar. 14-31, inclusive, estimated by comparison with records at North Woodstock station and from climatologic data.

MERRIMAC RIVER AT FRANKLIN JUNCTION, N. H.

Location.—At covered wooden bridge of the Boston & Maine Railroad near Franklin Junction, N. H., about 1 mile below the confluence of Pemigewasset and Winnepesaukee rivers.

Records available.—July 8, 1903, to December 31, 1912.

Drainage area.—1,460 square miles.

Gage.—Standard chain fastened to floor of bridge on upstream side over the right-hand channel. A gage painted on the downstream right-hand side of the center pier is used by the United States Weather Bureau for high-water readings.

Channel.—Coarse gravel and bowlders; fairly permanent.

Discharge measurements.—Made from upstream side of the bridge.

Winter flow.—Ice usually affects the relation between gage height and discharge for short periods during the winter months.

Artificial control.—Several dams above the station on both Pemigewasset and Winnepesaukee rivers affect the discharge. The operation of the mills above the station causes more or less fluctuation in stage each working day. It is not known how much this affects the reliability of the records. Winnepesaukee, Squam, and New Found lakes also offer opportunities for storage and are under more or less regulation.

Accuracy.—During open-water periods the results are believed to be fairly good.

Cooperation.—All of the data published by the United States Geological Survey are based on chain gage readings which have been furnished by the Locks & Canals Co., of Lowell, Mass., since June 30, 1907.

No discharge measurements were made during 1912.

Daily gage height, in feet, of Merrimac River at Franklin Junction, N. H., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.4			7.6	6.2		3.85	4.25		4.8	5.4	
2	4.9			7.6	6.2		3.9	4.25		4.7	5.6	5.0
3	4.8			8.6	6.2	6.5	3.9	4.35	4.6	4.6		5.2
4	4.7			8.6	6.1	6.4	4.0		4.6	4.5	5.6	6.1
5	4.5			6.5		6.2	4.0	4.5	4.6	4.4	5.4	6.0
6	4.5			7.0	6.2	6.2	3.9	4.8	4.6		5.4	5.8
7					6.0	6.2		4.7	4.5	4.4	5.3	5.7
8	5.0			12.6	6.2	5.6	4.0	4.5		4.4	9.1	
9	5.0			9.1	6.2		3.95	4.35	4.35	4.35	8.3	5.4
10	5.6			7.2	6.2	5.4	3.9	4.4	4.4	4.4		5.4
11	5.7			6.8	6.3	5.2	4.0		4.4	4.4	6.1	5.4
12	5.6			4.8		5.2	3.95	7.2	4.4	4.4	6.0	5.4
13	5.7		5.0	6.8	6.3	5.0	8.85	6.1	4.25		5.8	5.0
14			5.0		6.2	5.0		5.4	4.2	4.5	6.2	4.7
15	5.9		5.2	6.8	6.4	5.0	4.0	5.1		4.5	6.3	
16	5.9		6.5	8.3	6.4		4.05	4.9	4.4	4.4	5.7	4.8
17	6.1			12.4	7.5	5.0	4.05	4.6	4.9	4.4		4.8
18	6.2		6.4	10.5	6.8	4.8	4.0		4.7	4.3	5.5	4.8
19	6.1		6.4	10.4		4.8	4.0	4.4	4.6	4.2	5.4	5.1
20	6.1		7.0	8.6	6.1	4.6	4.0	4.6	4.7		5.5	5.4
21			7.0			4.6		4.5	4.8	4.2	5.3	5.2
22	6.2		6.6	7.5	7.5	4.6	4.4	4.5		4.35	5.2	
23	6.0		6.2	8.9	6.8		4.7	4.4	4.7	4.4	5.2	4.8
24	5.8			9.0	6.6	4.4	4.5	4.3	4.8	9.9		4.8
25	5.7		5.4	7.8	6.4	4.4	4.3		4.7		5.2	
26	5.8		5.3	7.2		4.4	4.2	4.3	4.6		5.2	4.8
27	5.9		5.2	7.0	6.2	4.4	4.05	4.5	4.6		5.2	4.8
28			5.4		6.1	4.0		4.6	4.5			4.8
29	5.9		5.8	6.9	6.0	3.9	4.05	4.6		5.7	5.2	
30	5.9		8.0	6.8			4.0	4.6	4.8	5.6	5.1	4.7
31	5.9				7.2		4.2			5.5		5.2

NOTE.—Relation of gage height to discharge affected by ice during January, February, and March.

Daily discharge, in second-feet, of Merrimac River at Franklin Junction, N. H., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7,000	4,360	6,220	900	1,360	1,810	2,090	3,000	2,460
2	7,000	4,360	5,560	950	1,360	1,810	1,950	3,320	2,380
3	9,000	4,360	4,900	950	1,480	1,810	1,810	3,320	2,680
4	9,000	4,180	4,720	1,060	1,580	1,810	1,680	3,320	4,180
5	4,900	4,270	4,360	1,060	1,680	1,810	1,550	3,000	4,000
6	5,840	4,360	4,360	950	2,090	1,810	1,550	3,000	3,660
7	11,600	4,000	4,360	1,000	1,950	1,680	1,550	2,840	3,490
8	17,400	4,360	3,320	1,060	1,680	1,580	1,550	10,000	3,240
9	10,000	4,360	3,160	1,000	1,480	1,480	1,480	8,400	3,000
10	6,220	4,360	3,000	950	1,550	1,550	1,550	6,290	3,000
11	5,460	4,540	2,680	1,060	3,880	1,550	1,550	4,180	3,000
12	2,090	4,540	2,680	1,000	6,220	1,550	1,550	4,000	3,000
13	5,460	4,540	2,380	900	4,180	1,360	1,620	3,660	2,380
14	5,460	4,360	2,380	980	3,000	1,300	1,680	4,360	1,950
15	5,460	4,720	2,380	1,060	2,530	1,420	1,680	4,540	2,020
16	8,400	4,720	2,380	1,120	2,230	1,550	1,550	3,490	2,090
17	17,000	6,800	2,380	1,120	1,810	2,230	1,550	3,320	2,090
18	13,000	5,460	2,090	1,060	1,680	1,950	1,420	3,160	2,090
19	12,800	4,820	2,090	1,060	1,550	1,810	1,200	3,000	2,530
20	9,000	4,180	1,810	1,060	1,810	1,950	1,300	3,160	3,000
21	7,900	5,490	1,810	1,300	1,680	2,090	1,300	2,840	2,680
22	6,800	6,800	1,810	1,550	1,680	2,020	1,480	2,680	2,380
23	9,600	5,460	1,680	1,950	1,550	1,950	1,550	2,680	2,090
24	9,810	5,080	1,550	1,680	1,420	2,090	11,700	2,680	2,090
25	7,400	4,720	1,550	1,420	1,420	1,950	16,000	2,680	2,090
26	6,220	4,540	1,550	1,300	1,420	1,810	10,000	2,680	2,090
27	5,840	4,360	1,550	1,120	1,680	1,810	7,000	2,680	2,090
28	5,740	4,180	1,060	1,120	1,810	1,680	5,000	2,680	2,090
29	5,650	4,000	950	1,120	1,810	1,880	3,490	2,680	2,020
30	5,460	5,110	925	1,060	1,810	2,090	3,320	2,530	1,950
31	....	6,220	....	1,300	1,810	....	3,160	....	2,690

NOTE.—Daily discharge determined from somewhat uncertain rating curve. No measurements were made during 1912 to verify this curve. Discharge Oct. 25 to 28, inclusive, estimated by comparison with records of Pemigewasset River at Plymouth, N. H., assuming a constant rate of flow during this period from Lake Winnepesaukee. Discharge interpolated for other days on which gage was not read.

Monthly discharge of Merrimac River at Franklin Junction, N. H., for 1912.

[Drainage area, 1,460 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	1,800	1.23	1.42	D.
February	....	....	1,850	1.27	1.37	D.
March	....	....	3,500	2.40	2.77	D.
April	17,400	2,090	8,080	5.53	6.17	B.
May	6,800	4,000	4,760	3.26	3.76	B.
June	[a] 6,220	[a] 925	2,720	1.86	2.08	B.
July	1,950	900	1,140	.781	.90	C.
August	6,220	1,360	2,040	1.40	1.61	C.
September	2,230	1,300	1,770	1.21	1.35	C.
October	[b] 16,000	1,300	3,100	2.12	2.44	B.
November	10,000	2,530	3,670	2.51	2.80	B.
December	4,180	1,950	2,600	1.78	2.05	B.
The year	17,400	900	3,080	2.11	28.72	

[a] Interpolated. [b] Estimated.

NOTE.—Discharge Jan. 1-Mar. 31 estimated by comparison with the flow at other stations in the Merrimac Basin.

MERRIMAC RIVER AT GARVINS FALLS, N. H.

Location.—At the dam of the Manchester Traction, Light & Power Co., 4 miles below Concord, N. H. The Garvins Falls plant is one of a system including three water-power plants and one steam-power plant operated by this company. The Garvins Falls site, one of the best on Merrimac River, has been utilized since 1815, first in connection with Old Bow Canal and later to furnish power for a pulp mill.

Records available.—1904 to 1912.

Drainage area.—2,340 square miles.

Dam.—During 1903-4 an overfall dam of the ogee type, somewhat similar in cross section to the dam at Holyoke, was completed. This dam is 550 feet long between abutments, and about 800 feet over all, including the head gates, and is of stone masonry, substantially built. The new dam and head gates are situated about 800 feet downstream from the old dam, which was destroyed on the completion of the new structure.

Canal and wasteways.—A canal has been completed which is about 500 feet long and 74 feet wide at the water line; in the sides of this canal wasteways are provided, one 90 feet long at elevation 102 feet (the main crest of the dam being taken as elevation 100) and another 45 feet long at elevation 103 feet. A waste gate, 10 feet wide and capable of being lowered to elevation 93 feet, is also provided for use in floating out any obstructions which lodge against the racks.

Turbines.—There are six triplex turbines, of somewhat more than 1,000 horsepower each, and one small duplex turbine of 75 horsepower used in running exciters; each large unit has three 39-inch runners mounted on a horizontal shaft which revolves at 180 revolutions a minute. Two of the wheels in each set discharge through a common T center and draft tube near the forebay wall. The third wheel is set opposite a quarter turn at the downstream end of the casing and discharges through this quarter turn into a smaller draft tube. The top of the penstock opening is at elevation 95.5; the lower ends of the draft tubes are horizontal and are about 2 feet below the elevation of usual tail water. The gates for the runners are of the plain cylindrical pattern, without fingers, and are controlled by governors. The average head on the wheels is about 29 feet, and there are six 650-kilowatt 3-phase generators directly connected with the turbines.

Utilization of power.—The power developed is transmitted at 12,000 volts tension to Manchester, about 14 miles away, where it enters a substation and is transformed to a lower voltage and utilized through a distributing switchboard for light and power.

Computations of discharge.—Careful records of the pond and tailrace levels, wheel openings, etc., have been kept by the company since completion of the dam in 1904 and have been furnished for computations of flow by J. Brodie Smith, manager. A number of current-meter measurements have been made from time to time by engineers of the United States Geological Survey for the purpose of rating turbines and to assist in computing the flow over the dam.

Winter flow.—The flow over the dam is somewhat affected by ice during the winter.

Accuracy.—Conditions at this station favor accurate determinations of discharge.

Cooperation.—Records furnished for publication by Hollis French and Allen Hubbard.

Daily discharge, in second-feet, of Merrimac River at Garvins Falls, N. H., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,891	2,135	1,790	14,981	6,631	11,217	1,153	1,925	1,065	1,774	1,904	1,205
2	3,315	2,409	1,873	14,890	6,214	10,141	1,147	1,800	1,309	1,958	1,791	2,048
3	3,408	2,577	1,811	12,725	5,829	8,845	1,053	1,715	1,706	1,960	1,739	2.167
4	3,199	4,719	1,699	10,715	5,183	8,404	1,077	1,515	1,793	1,886	2,116	2,434
5	2,880	2,325	1,457	8,995	5,040	7,704	1,410	1,879	1,836	1,717	1,819	2,362
6	2,345	2,273	1,487	9,559	4,959	6,457	1,153	1,745	1,767	1,282	2,013	2,112
7	2,989	2,231	1,873	14,230	5,874	5,682	985	1,762	1,725	1,772	2,019	2,280
8	2,063	4,026	1,749	20,031	6,796	5,449	1,412	1 802	1 137	1.960	2,006	2,256
9	2,061	4,181	2,059	23,243	6,704	4,704	1,393	1,725	1,777	2,069	5,692	2,318
10	2,795	3,586	2,165	16,570	6,566	4,369	1,137	2,119	1,681	2,056	2,897	2,072
11	2,255	3,795	2,080	12,546	6,228	3,592	1,220	1,222	1,746	2,198	2,845	2,113
12	2,551	3,199	1,815	11,293	5,816	3,324	1,719	2,233	1,621	1,981	2,340	2,099
13	2,568	3,038	2,462	10,729	5,491	3,112	1,681	2,223	1,695	1,286	2,364	1,423
14	2,227	2,862	3,455	10,720	7,224	2.906	1,013	1,848	1,591	2,275	2,134	1,051
15	2,071	2,755	4,942	10,705	8,471	2,744	1,395	1,722	1,114	3,357	2,388	562
16	2,755	3,709	7,269	10,487	6,333	2,422	1,819	1,744	1,735	2,945	2,929	2,065
17	2,301	3.489	9.483	16,213	5,777	2,550	1,705	1,515	1,943	2,755	1,942	1,866
18	2,525	3,501	10,388	18,838	10,996	2,521	1,706	1,313	2,074	2,349	2.368	2,146
19	3,032	3,519	11,881	16,886	9.538	2.645	1,704	1,917	2,056	1.805	2.036	2,218
20	3,011	3,046	13,649	16,263	7,631	2,350	1,688	1,883	1,963	1,242	2,114	1,962
21	4,355	2,898	13,290	12,462	6,778	2,111	1,036	2,135	1,799	2,073	1,982	1,719
22	2,964	1,927	11,179	11,871	8,324	1,790	1,843	2,197	8,755	2,419	2,100	1,150
23	2,817	1,970	9,690	11,372	9,546	1.669	1,828	1,961	5,433	2,427	2,071	1,471
24	2,780	2,125	7,828	16,799	8,996	2,194	1.689	1,660	4,981	3,293	1,190	1,694
25	2,466	2,354	6,524	12,058	7,893	2,080	1,449	1,082	5,930	4,459	1,975	1,278
26	2,281	2,124	5,341	9,730	6,797	1,643	1,706	1,675	4,398	4,041	2,164	2,014
27	2,192	1,916	5,188	8,907	6,004	1,386	1,392	1,623	3,505	2,632	2,080	1,948
28	3,401	1,860	5,299	9,741	5,237	1,487	1,223	1,662	2,798	2,629	1,342	1,898
29	2,783	1,720	6,371	8,983	4,659	1,297	1,732	1,810	2,366	2,258	1,930	1,183
30	1,933	....	12,172	7,157	4.817	826	1,692	1,651	2,314	1,946	1,893	2,075
31	2,096	....	13,862	....	9,572	....	1,838	1,545	....	1,993	....	2,007

Monthly discharge of Merrimac River at Garvins Falls, N. H., for 1912.

[Drainage area, 2,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per sq. mile.	
January	4,355	1,933	2,720	1.16	1.34
February	4,719	1,720	2,837	1.21	1.30
March	13,862	1,857	5.875	2.51	2.89
April	23,243	7,157	12,290	5.25	5.86
May	10,996	4,659	6,836	2.92	3.37
June	11,217	826	3,921	1.68	1.87
July	1,838	985	1,452	.621	.72
August	2,233	1,082	1,762	.753	.87
September	8,755	1,065	2,520	1.08	1.20
October	4,459	1,242	2,284	.976	1.13
November	5,692	1,190	2,206	.943	1.05
December	2,434	562	1,844	.788	.91
The year	23,243	562	3,879	1.66	22.51

MERRIMAC RIVER AT LAWRENCE, MASS.

Location.—At the dam of the Essex Water Power Co. in Lawrence.

Records available.—1890–1912.

Diversions.—Water is diverted from the drainage basins of Sudbury and Nashua rivers for use by the Metropolitan district in the vicinity of Boston, but during a portion of the year water is wasted into the Merrimac at these diversion dams; consequently the drainage area is somewhat variable.

Drainage area.—

	Square miles.
Total of Merrimac River drainage basin above Lawrence	4,663
Nashua River drainage basin above gaging station at Clinton, Mass	118
Sudbury River drainage basin, Framingham Dam No. 1	75
Cochituate River drainage basin	18
Total of Nashua, Sudbury, and Cochituate river drainage basins	211
Net drainage of Merrimac River, excluding Nashua, Sudbury, and Cochituate river basins	4,452

Computations of discharge.—Careful record is kept of the flow over the dam and through the various wheels and gates in connection with the sale of power, and the quantity measured at Lawrence includes the water wasted into the Merrimac from the Sudbury, Nashua, and Cochituate drainage basins. In getting the absolute yield of the river this fact should be considered in reference to the drainage areas, either by deducting it from the Merrimac flow and using the net area and the net flow of the Merrimac, or by getting the total yield of both Sudbury and Nashua rivers with the Merrimac and using the total area. The estimate of the quantity wasted from Sudbury and Nashua drainage basins into the Merrimac is based on data furnished by the Metropolitan Water and Sewerage Board of Boston.

Accuracy.—Such care is taken in procuring the base data used and in making computations that the records are regarded as excellent.

Cooperation.—Records furnished for publication by R. A. Hale, principal assistant engineer of the Essex Water Power Co.

Average weekly discharge, in second-feet, of Merrimac River at Lawrence, Mass., for 1912.

[Weeks arranged in order of dryness at Lawrence.]

Week ending Sunday—	Merrimac River at Lawrence (total drainage area, 4,663 square miles).	Wasting into Merrimac River from diverted drainage basins (211 square miles).	Net yield of Merrimac River from 4,452 square miles.		Week ending Sunday—	Merrimac River at Lawrence (total drainage area, 4,663 square miles).	Wasting into Merrimac River from diverted drainage basins (211 square miles).	Net yield Merrimac River from 4,452 square miles.	
			For week	Per square mile.				For week	Per square mile.
	Sec.-ft.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*		*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
July 14	1,604	5	1,599	.359	Dec. 1	4,483	30	4,453	1.000
July 21	1,740	5	1,735	.390	Dec. 22	4,546	21	4,525	1.016
July 7	1,748	5	1,743	.392	June 16	4,652	9	4,643	1.043
Aug. 4	1,853	7	1,846	.415	Nov. 24	4,804	12	4,792	1.076
Oct. 13	1,885	5	1,880	.422	Dec. 15	4,805	15	4,790	1.076
Sept. 1	1,886	5	1,881	.423	Nov. 3	5,032	5	5,027	1.129
Sept 8	1,954	5	1,949	.438	Oct. 27	5,212	5	5,207	1.170
Sept. 15	2,020	5	2,015	.453	Dec. 8	5,702	37	5,665	1.272
July 28	2,097	7	2,090	.469	Nov. 10	6,456	9	6,447	1.448
Oct. 20	2,100	9	2,091	.470	Nov. 17	6,884	16	6,868	1.543
Oct. 6	2,101	5	2,096	.471	May 5	9,578	117	9,461	2.125
Aug. 25	2,110	6	2,104	.473	May 12	9,767	177	9,590	2.154
Aug. 11	2,126	7	2,119	.476	June 9	10,232	56	10,176	2.286
Sept. 22	2,277	5	2,272	.510	June 2	10,941	239	10,702	2.404
June 30	2,490	5	2,485	.558	May 19	11,695	278	11,417	2.564
Feb. 18	2,558	7	2,551	.573	May 26	12,079	308	11,771	2.644
Sept. 29	2,637	5	2,632	.591	Mar. 17	12,977	439	12,538	2.816
Feb. 11	2,758	27	2,731	.613	Mar. 31	15,640	282	15,358	3.450
Aug. 18	2,887	6	2 881	.647	Apr. 28	15,883	133	15,750	3.538
Feb. 4	2,964	16	2,948	.662	Apr. 21	19,754	196	19,558	4.393
Jan. 14	3,135	16	3,119	.701	Apr. 7	22,086	350	21,736	4.882
Jan. 21	3,212	23	3,189	.716	Apr. 14	22,234	176,	22,058	4.955
June 23	3,306	5	3,301	.741	Mar. 24	22,461	314	22,147	4.975
Mar. 10	3,315	47	3,268	.734					
Feb. 25	3,607	89	3,518	.790					
Jan. 28	3,844	26	3,818	.858	52 weeks total	324,518	3,757	320,761	72.049
Dec. 29	3,913	31	3,882	.872					
Jan. 7	4,164	25	4,139	.930					
Mar. 3	4,324	124	4,200	.943	Weekly average	6,241	72	6,169	1.386

Daily discharge, in second-feet, of Merrimac River at Lawrence, Mass., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,300	2,962	4,511	25,394	9,910	15,218	2,359	2,384	[a]231	2,827	4,314	[a]2,995
2	4,715	3,075	3,171	24,821	9,584	[a]14,985	2,622	2,263	500	2,371	2,999	5.197
3	5,053	2,251	[a]2,195	24,771	9,032	13,631	2,561	1,452	2,848	2,452	[a]3,265	3.899
4	4,706	[a]1,527	4,735	22,306	7,384	12,727	500	[a]196	2,771	2.606	5,953	4.142
5	4,608	3,894	3,525	18,986	[a]7,205	11,840	2,268	2,476	2,720	1,855	4,835	6,891
6	2,728	3,277	3,345	17,881	8,471	10,236	1,539	2,784	2.619	[a]175	4,434	6,607
7	[a]2.039	3,028	3,286	[a]20,440	7,886	8.946	[a]384	2,664	1,877	2,600	4,185	6.054
8	4,547	2,855	3,447	26,173	9,899	7,367	1,941	2,648	[a]342	2.769	4.190	[a]7,122
9	3,946	2,954	2,751	30,720	10,465	[a]6,880	1.738	2.581	2.841	2.429	9.931	7.549
10	3,003	2,297	[a]2,118	26,689	11,063	7,744	2,080	1,539	2,904	2,363	[a]11,667	6,002
11	3,291	[a]1,003	4,944	21 254	10,683	5,290	2,131	[a]187	2,758	2,480	9,059	5,274
12	3,275	3,522	4,428	18.416	[a]9,901	4,936	1.931	2,297	2.143	328	6.972	4,999
13	2,433	2,962	6,562	16,678	10,269	4,554	1,189	4.160	2.004	[a]223	6,066	4.703
14	[a]1,452	2,826	10,091	[a]15.709	9,961	4,519	[a]219	4.670	1,318	2.359	5.639	2.723
15	4,021	2,716	16,600	16,201	11,331	2,879	1,987	3,580	[a]175	2,482	6,126	[a]2,387
16	3,383	2,814	23,200	15,672	10,767	[a]2,641	2.249	3.264	2.351	2,426	7,397	5,105
17	3,231	2,216	[a]25,012	17,604	10,878	5,139	2.141	1,891	2.659	2,696	[a]6,927	4.149
18	2,920	[a]851	26,067	22,816	14.212	3,853	1.992	[a]345	2,690	2,757	6,982	3,892
19	3.373	3.190	25,863	23,500	[a]14,444	3,197	2.131	3,087	2.694	1,707	5,897	4,142
20	2,514	3,144	25,262	22,394	12,699	3,625	1,464	2,896	2,978	[a]186	5,436	4,705
21	[a]3,041	3,231	25,017	[a]20,089	10,909	3,975	[a]213	2,462	1,987	2,192	5,016	4,880
22	4,814	2,742	21,445	17,964	11.087	2,556	2.361	2.272	[a]577	2,070	4.407	[a]4,951
23	4,539	5,339	18,030	16,689	13.252	[a]796	2,309	2,299	4.005	2,049	2,881	5,821
24	4,310	3,848	[a]15.546	18,622	13,215	3,892	2,486	1,474	3.318	2,508	[a]3.011	4.517
25	4,085	[a]3,758	12,967	18,508	12,250	3,284	2,713	[a]277	2,971	6,075	5,294	1,926
26	4,150	5,964	11,425	14,552	[a]11,143	3,108	2,878	2,857	2,913	12,358	4,939	4,788
27	2,550	5,098	10,888	12,877	10,662	2,939	1,753	2,296	3,008	[a]9.234	5,388	4,199
28	[a]2,462	4,812	10,650	[a]11,972	9,219	2,386	[a]175	2,187	1.959	8,185	3,703	2,864
29	4,376	4,518	13,241	12,994	8,234	1,620	2,227	2.179	[a]285	6,356	5,585	[a]3,276
30	3,453	....	23,802	10,940	6,945	[a]201	2,189	2,169	2,422	5,392	3,479	6,059
31	3,104	....	[a]26,509	....	11,325	....	2,259	1,282	....	4,716	....	6,676

[a] Sunday.

Monthly discharge of Merrimac River at Lawrence, Mass., for 1912.

[Drainage area, 4,452 square miles.]

Month.	Mean discharge of Merrimac River at Lawrence as measured (total drainage area, 4,663 square miles).	Wasting into Merrimac River from diverted drainage basins (211 square miles).	Average yield of Merrimac River from 4,452 square miles.		Run-off (depth in inches on drainage area).
			Mean.	Per square mile.	
	Sec.-ft.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*	
January	3,594	22	3,572	0.802	0.92
February	3,196	51	3,145	.706	.76
March	12,601	255	12,346	2.773	3.19
April	19,454	208	19,246	4.323	4.82
May	10,461	236	10,225	2.297	2.65
June	5,832	26	5,806	1.304	1.45
July	1,838	5	1,833	.412	.48
August	2,230	7	2,223	.499	.58
September	2,162	5	2,157	.485	.54
October	3,268	6	3,262	.733	.85
November	5,533	15	5,518	1.239	1.38
December	4,790	32	4,758	1.069	1.23
The year	6,246	72	6,174	1.387	18.85

SOUHEGAN RIVER AT MERRIMAC, N. H.

Location.—Just above Atherton Falls, about 1½ miles above the dam of the W. H. McElwain Co., below the mouth of Stony Branch, and just above the junction of the Souhegan with the Merrimac.

Records available.—July 13, 1909, to December 31, 1912.

Drainage area.—168 square miles.

Gages.—Vertical staff on the left bank 40 feet above the falls, used until April 11, 1911, when it was washed out. On April 12, 1911, a chain gage was attached to a tree about 300 feet upstream from the staff gage. Both gages refer to the same datum.

Channel.—One at all stages. Not liable to shift.

Discharge measurements.—At high stages from bridges above and below the station; at low stages by wading at a section below the gage.

Artificial control.—Flow affected by the operation of mills at Milford, about 8 to 10 miles above, which causes a few hundredths of a foot difference between the morning and afternoon readings. In determining the daily discharge, it is assumed that the average of these readings gives essentially the true 24-hour mean. No information is available regarding night storage at Milford.

Winter flow.—Relation of gage height to discharge is not greatly affected by ice.

Accuracy.—Discharge rating curve quite well developed.

Cooperation.—Established and maintained in cooperation with the W. H. McElwain Co.

Discharge measurements of Souhegan River at Merrimac, N. H., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 8	G. H. Canfield	2.10	25.6
8	do	2.09	25.3

Daily gage height, in feet, of Souhegan River at Merrimac, N. H., for 1912.

[R. J. Sylvester, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	....	3.0	5.0	3.5	3.65	2.21	2.28	2.17	2.18	2.46	2.80
2	....	....	2.98	5.1	3.3	3.5	2.18	2.34	2.16	2.20	2.50	2.78
3	....	....	2.76	5.1	3.3	3.25	2.18	2.32	2.18	2.21	2.52	3.45
4	....	....	2.75	5.0	3.3	3.25	2.18	2.28	2.35	2.17	2.51	2.92
5	....	....	2.76	5.1	3.3	3.2	2.18	2.24	2.39	2.14	2.55	3.35
6	....	....	2.76	5.1	3.3	2.91	2.20	2.1[illegible]	2.42	2.17	2.50	3.35
7	....	....	2.78	5.1	3.3	2.86	2.20	2.16	2.34	2.20	2.48	3.6
8	....	2.73	2.92	5.2	3.4	2.86	2.18	2.10	2.34	2.22	3.65	3.35
9	....	2.72	3.1	5.2	3.6	2.67	2.16	2.10	2.32	2.20	3.6	3.2
10	....	2.73	3.1	5.2	3.95	2.63	2.14	2.09	2.24	2.19	3.25	3.4
11	....	2.72	3.1	5.1	3.7	2.60	2.16	2.16	2.24	2.20	2.96	3.25
12	....	2.73	3.4	4.9	3.4	2.57	2.14	2.21	2.20	2.18	2.99	3.05
13	....	2.75	4.8	3.45	3.35	2.53	2.15	2.25	2.18	2.15	2.93	2.80
14	....	2.75	5.3	3.85	3.35	2.52	2.28	2.26	2.16	2.16	3.0	2.78
15	....	2.84	5.9	3.35	3.3	2.50	2.35	2.32	2.20	2.20	4.1	2.76
16	....	2.78	6.5	2.97	3.4	2.50	2.42	2.33	2.38	2.20	4.1	2.75
17	....	3.15	6.4	3.25	4.1	2.48	2.38	2.32	2.46	2.19	4.0	2.78
18	....	....	6.1	3.55	4.0	2.48	2.40	2.94	2.46	2.19	3.1	2.80
19	....	....	5.6	4.3	3.55	2.45	2.36	2.37	2.36	2.19	3.1	2.99
20	....	....	5.3	4.3	3.5	2.42	2.33	2.42	2.30	2.20	3.05	3.7
21	....	....	4.8	3.9	3.7	2.39	2.40	2.40	2.28	2.16	2.98	3.5
22	....	....	4.5	3.7	4.1	2.40	2.42	2.38	2.26	2.02	2.92	3.1
23	....	....	4.2	3.75	4.0	2.42	2.44	2.40	2.25	2.12	2.82	2.94
24	....	....	3.75	3.8	3.85	2.40	2.42	2.42	2.24	2.56	2.84	2.75
25	....	3.2	3.7	3.85	3.7	2.40	2.40	2.36	2.22	3.12	3.15	2.82
26	....	3.25	3.6	3.9	3.2	2.38	2.36	2.29	2.20	2.94	3.45	2.77
27	....	3.2	3.55	3.85	3.15	2.36	2.31	2.24	2.20	2.70	3.3	3.05
28	....	3.15	3.5	3.2	3.1	2.35	2.20	2.09	2.20	2.63	3.05	3.2
29	....	3.05	4.7	3.2	3.1	2.29	2.28	2.18	2.20	2.60	2.80	3.0
30	....	....	6.6	3.45	3.4	2.22	2.26	2.18	2.18	2.52	2.80	3.15
31	....	....	5.5	....	3.6	....	2.24	2.16	....	2.52	....	4.8

NOTE.—No record Jan. 1 to Feb. 7 or Feb. 18 to 24, inclusive.

Daily discharge, in second-feet, of Souhegan River at Merrimac, N. H., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			230	1,400	447	521	38	47	34	35	75	161
2			223	1,470	355	447	35	55	33	37	83	155
3			149	1,470	355	333	35	52	35	38	87	424
4			146	1,400	355	333	35	47	56	34	85	201
5			149	1,470	355	311	35	42	62	32	94	378
6			149	1,470	355	198	37	36	68	34	83	378
7			155	1,470	355	181	37	33	55	37	79	496
8		140	201	1,550	400	181	35	28	55	39	521	378
9		137	269	1,550	496	123	33	28	52	37	496	311
10		140	269	1,550	682	113	32	27	42	36	333	400
11		137	269	1,470	546	105	33	33	42	37	216	333
12		140	400	1,320	400	98	32	38	37	35	226	250
13		146	1,240	424	378	90	32	43	35	32	205	161
14		146	1,630	626	378	87	47	44	33	33	230	155
15		174	2,130	378	355	83	56	52	37	37	770	149
16		155	2,670	219	400	83	68	54	61	37	770	146
17		290	2,580	333	770	79	61	52	75	36	710	155
18			2,310	472	710	79	64	208	75	36	269	161
19			1,880	895	472	74	58	60	58	36	269	226
20			1,630	895	447	68	54	68	49	37	250	546
21			1,240	653	546	62	64	64	47	33	223	447
22			1,030	546	770	64	68	61	44	22	201	269
23			830	572	710	68	72	64	43	30	168	208
24			572	599	626	64	68	68	42	96	174	146
25		311	546	626	546	64	64	58	39	277	290	168
26		333	496	653	311	61	58	48	37	208	424	152
27		311	472	626	290	58	50	42	37	131	355	250
28		290	447	311	269	56	37	27	37	113	250	311
29		250	1,170	311	269	48	47	35	37	105	161	230
30			2,760	424	400	39	44	35	35	87	161	290
31			1,790		496		42	33		87		1,240

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Souhegan River at Merrimac, N. H., for 1912.

[Drainage area, 168 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March	2,670	146	969	5.77	6.65	A.
April	1,550	219	905	5.39	6.01	A.
May	770	269	459	2.73	3.15	A.
June	521	39	139	.828	.92	A.
July	72	32	47.5	.283	.33	B.
August	208	27	51.0	.304	.35	B.
September	75	33	46.4	.276	.31	B.
October	277	22	61.4	.366	.42	B.
November	770	75	275	1.64	1.83	A.
December	1,240	68	299	1.78	2.05	A.

SOUTH BRANCH OF NASHUA RIVER (WACHUSETT DRAINAGE AREA) AT CLINTON, MASS.

Location.—At Clinton, Mass.

Records available.—July, 1896, to December, 1912.

Drainage area.—118.19 square miles.

Computations of discharge.—A large reservoir, storing about 8,500,000,000 cubic feet, was constructed at Clinton, Mass., and has stored water since 1903. Beginning with 1897 the estimates of discharge have been corrected for gain and loss of storage in reservoirs and mill ponds, so that the results show the natural flow of the stream.

The yield reported per square mile is the yield of the drainage area, including the water surfaces. In the Wachusett basin this water surface for the years 1897 to 1902, inclusive, amounted to 2.2 per cent of the whole area; in 1903, 2.4

per cent; in 1904, 3.6 per cent; in 1905, 4.1 per cent; in 1906, 5.1 per cent; in 1907, 6.0 per cent; and in 1908 and subsequent years, 7.0 per cent.

The accompanying tables give data on discharge and precipitation for 1912, also the average for the years 1897-1912, inclusive, precipitation averages being based on records at several stations in the Nashua drainage basin.

Cooperation.—Data furnished for publication by the Metropolitan Water and Sewerage Board, Dexter Brackett, chief engineer.

Yield and rainfall in South Branch of Nashua River basin (Wachusett drainage area) at Clinton, Mass., for 1912, and summaries for 1897-1912.

[Drainage area, 118.19 square miles.]

Month.	Total yield (million gallons).	Yield per square mile.		Rainfall (inches).	Rainfall collected.	
		Million gallons per day.	Second-feet.		Inches.[a]	Per cent.
1912.						
January	2,859.8	0.780	1.208	2.57	1.392	54.2
February	3,177.2	.927	1.434	2.42	1.547	63.8
March	10,372.0	2.831	4.380	5.69	5.050	88.8
April	8,088.4	2.281	3.530	4.06	3.938	97.0
May	6,583.4	1.797	2.780	5.76	3.206	55.7
June	1,173.7	.331	.512	.48	.571	119.6
July	493.0	.135	.208	2.65	.240	9.1
August	459.2	.125	.194	2.89	.224	7.7
September	316.8	.089	.138	2.17	.154	7.1
October	530.8	.145	.224	2.53	.258	10.2
November	1,565.6	.442	.683	4.02	.762	18.9
December	2,904.3	.793	1.227	4.95	1.414	28.5
The year	38,524.2	.891	1.378	40.19	18.756	46.7
1897-1912.						
January	69,440.7	1.184	1.832	3.67	2.113	57.6
February	74,509.6	1.398	2.162	3.81	2.267	59.6
March	158,208.7	2.698	4.174	4.31	4.814	111.7
April	122,479.7	2.159	3.340	3.87	3.727	96.2
May	69,833.2	1.191	1.843	3.47	2.125	61.3
June	44,232.8	.780	1.206	3.82	1.346	35.3
July	23,339.5	.398	.616	4.01	.710	17.7
August	23,543.4	.402	.621	4.22	.717	17.0
September	20,876.6	.368	.569	3.77	.635	16.9
October	30,669.5	.523	.809	3.40	.933	27.4
November	45,866.6	.809	1.251	3.48	1.396	40.1
December	72,136.2	1.231	1.904	4.30	2.195	51.1
The year	755,136.5	1.094	1.692	46.13	22.978	49.8

[a] For 1912, total for month; 1897-1912, average of totals per calendar month.

SUDBURY RIVER AT FRAMINGHAM AND LAKE COCHITUATE AT COCHITUATE, MASS.

Location.—On Sudbury River at Framingham and on Lake Cochituate at Cochituate.

Records available.—Sudbury River and Lake Cochituate have been studied by the engineers of the city of Boston, the State Board of Health of Massachusetts, and the Metropolitan Water and Sewerage Board; records of rainfall have been kept in the Sudbury basin since 1875 and in the Cochituate basin since 1852, but the latter are considered of doubtful accuracy previous to 1872.

Storage reservoirs.—Storage reservoirs have been constructed by the city of Boston and the Metropolitan Water and Sewerage Board controlling the greater part of the flow from these basins. Lake Cochituate, which drains into Sudbury River a short distance below Framingham, is controlled as a storage reservoir by the Metropolitan Waterworks. In the Sudbury River basin the water surfaces exposed by evaporation have been increased from time to time by the construction of additional storage reservoirs. From 1875 to 1878, inclusive, the water surface amounted to 1.9 per cent of the total area; from 1879 to 1884, to 3.0 per cent; 1885 to 1893, to 3.4 per cent; 1894 to 1897, to 3.9 per cent; 1898 and subsequent years, 6.5 per cent.

Determinations of discharge.—The recorded yields of both the Sudbury and Cochituate drainage areas are somewhat affected by the fact that the towns of Framingham, Natick, and Westboro draw public water supplies from within the basins and discharge the sewerage outside. Although the quantities diverted are taken into consideration in determining the run-off, the results are probably less accurate since the sewerage diversion works were constructed.

The public water and sewerage works were installed in these towns as follows:

	Water supply.	Sewerage works.
Framingham	1885	1889
Natick	1874	1896
Westboro	1879	1892

All the water drawn from the Wachusett drainage area is passed through the reservoirs in the Sudbury basin, and as the measurement of these quantities must be used in determining the yield of the Sudbury basin, the unavoidable small percentages of error in the measurement of large quantities of water render less accurate the figures giving yields of the Sudbury water supply during months of low yield for years subsequent to 1897.

Cooperation.—Data furnished for publication by the Metropolitan Water and Sewerage Board, Dexter Brackett, chief engineer.

Yield and rainfall in Sudbury River basin at Framingham, Mass., for 1912, and summaries for 1875–1912.

[Drainage area, 75.2 square miles.]

Month.	Total yield (million gallons).	Yield per square mile.		Rainfall (inches).	Rainfall collected.	
		Million gallons per day.	Second-feet.		Inches.[a]	Per cent.
1912.						
January	1,697.4	0.728	1.127	2.94	1.299	44.1
February	2,610.8	1.197	1.852	2.77	1.998	72.2
March	7,207.2	3.092	4.783	6.46	5.516	85.3
April	5,043.0	2.235	3.459	4.37	3.859	88.3
May	3,372.1	1.447	2.238	4.55	2.580	56.7
June	333.7	.148	.229	.46	.255	56.1
July	−178.7	−.077	−.119	3.24	−.137	-4.2
August	− 68.7	−.029	−.046	3.05	−.052	−1.7
September	− 64.1	−.028	−.044	1.76	−.049	−2.8
October	− 32.0	−.014	−.021	2.35	−.024	−1.0
November	372.5	.165	.255	3.64	.285	7.8
December	1,152.5	.494	.765	5.13	.882	17.2
The year	21,445.7	.779	1.206	40.72	16.410	40.3
1875–1912.						
January	105,946.4	1.196	1.850	4.11	2.134	52.0
February	138,859.7	1.721	2.663	4.17	2.796	67.1
March	247,893.2	2.798	4.329	4.42	4.992	112.8
April	171,088.5	1.996	3.087	3.52	3.445	97.9
May	94,593.9	1.068	1.652	3.31	1.905	57.6
June	42,650.5	.498	.770	3.06	.859	28.0
July	14,109.0	.159	.246	3.54	.284	8.0
August	20,724.4	.234	.362	3.86	.417	10.8
September	20,461.4	.239	.369	3.45	.412	11.9
October	38,721.5	.437	.676	3.88	.780	20.1
November	67,458.1	.787	1.217	3.85	1.358	35.3
December	83,751.8	1.002	1.549	3.84	1.787	46.6
The year	1,051,258.4	1.007	1.558	45.01	21.169	47.0

[a] For 1912, total for month; 1875–1912, average of totals per calendar month.

Yield and rainfall in Lake Cochituate basin at Cochituate, Mass., for 1912, and summaries for 1863–1911.

[Drainage area, 17.58 square miles.]

Month.	Total yield (million gallons).	Yield per square mile.		Rainfall (inches).	Rainfall collected.	
		Million gallons per day.	Second-feet.		Inches.[a]	Per cent.
1912.						
January	345.4	0.634	0.981	3.10	1.13	36.5
February	587.4	1.152	1.783	2.51	1.92	76.6
March	1,501.3	2.755	4.262	6.38	4.91	77.0
April	1,031.2	1.955	3.025	4.16	3.38	81.1
May	790.6	1.451	2.245	5.23	2.59	49.5
June	142.2	.270	.417	.47	.46	98.0
July	21.9	.040	.062	3.00	.07	2.4
August	41.6	.076	.118	2.26	.14	6.0
September	119.6	.227	.351	1.82	.39	21.5
October	149.7	.275	.425	2.99	.49	16.4
November	176.0	.334	.516	3.24	.58	17.8
December	335.6	.616	.953	4.96	1.10	22.1
The year	5,242.5	.815	1.261	40.12	17.16	42.8
1863–1912.						
January	29,850.3	1.095	1.694	3.91	1.95	50.0
February	37,946.8	1.529	2.365	3.94	2.48	63.1
March	58,770.4	2.157	3.337	4.33	3.85	88.8
April	44,012.4	1.669	2.582	3.60	2.88	80.0
May	25,925.0	.951	1.472	3.61	1.70	47.0
June	11,996.0	.455	.704	3.00	.78	26.2
July	7,433.8	.273	.422	3.91	.49	12.4
August	10,651.6	.391	.605	4.14	.70	16.8
September	10,933.6	.415	.642	3.54	.72	20.2
October	14,694.7	.539	.834	4.11	.96	23.4
November	20,341.0	.771	1.193	4.03	1.33	33.0
December	25,048.4	.919	1.422	3.59	1.64	45.7
The year	297,604.0	.927	1.434	45.71	19.48	42.6

[a] For 1912, total for month; 1863–1912, average of totals per calendar month.

BLACKSTONE RIVER BASIN.

BRANCH RIVER AT BRANCH VILLAGE, R. I.

Location.—At Branch Village, just below the mill of James Pitts & Son, three-quarters of a mile from Forestdale and about 2 miles from Woonsocket.

Records available.—September 2, 1909, to December 31, 1912.

Drainage area.—93 square miles.

Gages.—Staff, bolted to a ledge about 500 feet below the dam and mill; also a chain gage attached to a tree on top of the ledge. Gage heights referred to the staff gage.

Channel.—Fairly favorable for accurate measurements.

Discharge measurements.—At low and medium stages made by wading; at high stages from the bridge above the dam or from a boat.

Artificial control.—Gage heights are affected by the mill control directly above the station and also by one farther up the river. The available storage above the Pitts Mill is small, and water passes over the dam much of the time.

Winter flow.—Relation between the gage heights and discharge affected by ice only in severe weather.

Accuracy.—Accurate computation of the diurnal fluctuation of discharge caused by the operation of the mills above the station has been rendered impossible by insufficient funds.

Cooperation.—Established and maintained in cooperation with the Natural Resources Survey of the State of Rhode Island. Gage heights furnished by James Pitts & Son.

Daily gage height, in feet, of Branch River at Branch Village, R. I., for 1912.

Day.	January.		February.		March.		April.		May.		June.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1	2.4	2.4	1.4	2.45	2.2	2.5	3.35	3.35	2.8	3.0	2.1	1.6
2	2.4	2.6	1.6	2.45	2.0	1.95	3.1	3.3	2.5	2.6	1.85	1.85
3	2.25	2.5	1.5	1.65	1.3	1.45	3.35	3.6	2.2	2.5	1.9	2.4
4	2.05	2.5	1.55	1.55	1.9	2.5	3.2	3.1	2.1	2.0	1.8	2.3
5	1.95	2.55	1.5	2.45	1.9	2.35	2.8	3.0	1.85	1.85	1.35	2.2
6	1.85	2.4	1.5	2.4	1.7	2.5	2.7	1.9	1.95	2.5	1.3	2.25
7	1.75	1.75	1.5	2.4	1.6	2.45	2.0	2.05	2.2	2.55	1.3	2.1
8	1.7	2.5	1.5	2.4	1.6	2.55	2.7	3.15	2.2	2.6	1.3	1.0
9	1.9	2.65	1.55	2.4	1.6	1.65	2.85	2.95	2.45	2.8	1.6	1.6
10	1.85	2.5	1.5	2.4	1.8	1.9	2.65	2.9	2.45	2.7	1.65	1.9
11	2.0	2.5	1.55	1.55	1.9	2.3	2.55	2.8	2.45	2.3	1.2	1.8
12	1.9	2.5	1.55	2.4	1.9	2.5	2.35	2.7	2.5	2.6	1.1	1.95
13	1.65	1.95	1.4	2.35	3.35	5.5	3.35	2.2	2.7	2.9	.85	1.9
14	1.45	1.5	1.1	2.35	4.7	3.7	2.3	2.35	2.5	2.8	.65	1.9
15	1.5	2.55	1.25	2.3	3.35	3.6	2.4	2.8	2.2	2.45	.65	1.25
16	1.65	2.5	1.45	2.25	5.85	5.75	2.45	2.8	2.0	2.7	.6	.6
17	1.85	2.5	1.2	1.4	3.75	3.5	2.45	2.75	2.75	3.05	.6	1.8
18	1.8	2.5	1.45	1.5	3.35	3.3	2.6	3.1	2.6	2.4	.65	1.9
19	1.9	2.9	1.5	2.4	2.95	3.0	3.3	3.6	2.15	2.15	.65	2.05
20	2.5	2.7	1.3	2.4	2.65	3.0	3.2	3.0	2.2	2.5	.65	1.9
21	2.3	2.3	2.0	2.5	2.45	2.8	2.6	2.6	2.1	2.4	.7	1.8
22	2.35	2.5	3.85	4.85	2.65	3.0	2.65	2.95	2.05	2.4	.8	1.0
23	2.25	2.5	2.95	2.85	2.6	2.75	2.15	3.0	2.1	2.4	1.0	1.0
24	2.05	2.5	2.55	2.7	2.8	2.85	2.5	3.0	1.9	2.35	1.05	1.9
25	2.0	2.5	2.2	2.2	3.2	3.2	2.5	2.85	2.2	1.9	1.0	1.95
26	1.9	2.45	2.35	2.75	2.9	3.0	2.4	2.8	2.3	2.3	1.05	2.0
27	1.95	2.0	3.1	3.7	2.75	3.05	2.45	2.4	2.2	2.55	.75	1.9
28	1.5	1.5	3.0	2.9	2.95	3.2	2.3	2.3	2.05	2.4	.8	1.9
29	1.95	2.4	2.55	2.6	3.0	4.4	2.3	2.75	1.75	2.3	.9	1.35
30	1.5	2.4	......	......	5.0	4.85	2.7	3.1	1.7	2.2	1.0	1.0
31	1.45	2.45	......	......	4.6	4.4	......	......	2.0	2.5	......	......

Day.	July.		August.		September.		October.		November.		December.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1	1.05	1.7	0.85	1.95	0.85	0.85	0.6	1.15	0.7	1.85	0.85	0.85
2	1.05	2.0	.9	1.9	.9	.9	.6	1.9	.75	1.45	.85	1.95
3	1.05	2.0	.9	1.25	.9	1.95	.6	1.8	.7	.7	.9	1.9
4	.95	1.0	.55	.55	.9	1.9	.85	1.65	.7	1.65	.85	1.9
5	1.05	1.2	.55	1.9	.9	1.95	.95	1.45	.7	1.65	.85	1.9
6	.6	.8	.9	1.9	.9	1.9	.9	.9	.65	1.5	.9	1.9
7	.75	.75	.85	1.9	.85	1.65	.9	1.6	.7	1.65	.9	1.5
8	.8	1.95	.9	1.9	.8	.8	.85	1.7	.85	1.75	.85	.85
9	.65	1.95	.9	1.9	.8	1.9	.85	1.7	.65	1.35	.85	1.9
10	.7	2.0	.9	1.65	.7	1.9	.8	1.6	.6	.6	.9	1.8
11	.6	1.95	.8	.85	.8	1.95	.75	1.0	.6	1.9	.9	1.9
12	.65	2.0	.9	1.9	.8	1.8	.75	.85	.8	1.9	.85	1.9
13	.7	1.3	.85	1.95	.85	1.7	.85	.85	.8	1.9	.85	1.9
14	.7	.7	.85	1.95	.7	1.35	.85	.7	.85	1.95	.85	1.55
15	.8	1.9	.9	1.95	.7	.7	.65	.9	.85	1.9	.8	.8
16	.8	1.9	.9	1.95	.7	1.95	.6	.8	.85	1.7	.8	1.9
17	.9	1.9	.9	1.5	.75	1.9	.6	.85	.75	.75	.8	1.7
18	.9	1.95	.85	.9	.8	1.95	.6	.8	.8	1.9	.8	1.75
19	.95	1.9	.9	1.9	.8	1.85	.6	.9	.85	1.9	.85	1.75
20	.9	1.4	1.1	1.95	1.0	1.65	.6	.6	.85	1.9	.85	1.85
21	.9	.9	.95	1.9	.7	1.4	.6	1.5	.85	1.9	.85	1.55
22	.95	1.95	.9	1.9	.85	.85	.6	1.45	.85	1.95	.85	.85
23	1.05	1.9	.9	1.9	.9	1.95	.6	1.5	.8	1.6	.85	1.9
24	.9	1.9	.9	1.45	.7	1.85	.7	1.55	.8	.8	.85	2.0
25	.95	1.9	.9	.9	.7	1.7	.6	1.65	.85	1.9	.85	2.0
26	.95	1.95	.95	1.95	.75	1.7	.75	1.0	.85	1.9	.85	2.0
27	.95	1.35	.9	1.95	.7	1.6	.6	.6	.85	2.0	.9	2.1
28	.8	.8	.9	1.95	.7	1.2	.65	1.65	.85	.85	.9	1.6
29	.85	1.9	.9	1.95	.6	.6	.65	1.65	.85	1.85	.9	.9
30	.8	1.95	.9	1.95	.6	1.25	.7	1.65	.9	1.6	.9	2.2
31	.8	1.9	.85	1.6	......	......	.6	1.55	......	......	2.6	3.5

NOTE.—Gage read at about 6.30 a. m. and 5.30 p. m., except on Saturdays, when the last reading is taken about noon.

CONNECTICUT RIVER BASIN.

CONNECTICUT RIVER AT ORFORD, N. H.

Location.—At covered highway bridge between Orford, N. H., and Fairlee, Vt. Approximately 10 miles downstream (by river) from the mouth of Waits River.

Records available.—August 6, 1900, to December 31, 1912.

Drainage area.—3,300 square miles.

Gage.—Chain attached to the bridge; read once daily, datum unchanged.

Channel.—Wide and deep; gravelly bottom; subject to change.

Discharge measurements.—Made from the downstream side of the bridge by working through the open space near roof.

Artificial control.—There are numerous power plants on the tributaries of the Connecticut River and also on the main stream above the station which may have a slight effect on the variation of the daily discharge. The nearest dam downstream is at Wilder, 18 miles below the station. Backwater from this dam is believed to reach within a few miles of Orford.

Winter flow.—The relation of daily gage height to discharge is affected by ice during the winter months, usually from the first part of December to the last part of March, and sometimes well into April.

Accuracy.—Discharge rating curve fairly well defined. Open-water estimates considered fairly good. The upper part of the rating curve is defined by measurements made by the vertical velocity curve method and is considered stable. Frequent changes in the lower part of the curve have been necessitated during recent years by changes in the relation of gage height to discharge. Numerous measurements made under ice cover have defined fairly good rating curves for use in the periods during which ice existed. Owing to the smooth ice cover which forms at this station each year and the freedom from ice jams or needle ice, curves developed in earlier years are considered fairly good indexes of discharge in later years.

Cooperation.—Station maintained in cooperation with several New England power companies.

Discharge measurements of Connecticut River at Orford, N. H., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 21[a]	G. H. Canfield	5.28	1,370
Oct. 22	C. S. DeGolyer	5.31	2,550

[a] Made under complete ice cover 75 feet above bridge.

Daily gage height, in feet, of Connecticut River at Orford, N. H., for 1912.

[F. H. Gardner, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.9	5.2	....	14.7	13.2	20.8	4.7	3.0	5.7	7.6	6.6	6.0
2	9.4	....	5.2	15.2	11.7	21.8	4.4	3.4	5.6	7.8	6.9	6.0
3	9.0	5.4	....	13.8	11.0	20.8	4.2	3.8	5.4	7.4	6.9	7.0
4	8.9	....	5.2	13.0	10.6	19.4	4.1	4.4	5.0	6.8	6.6	8.6
5	8.4	5.5	....	12.5	10.0	17.0	4.0	5.1	4.8	6.4	6.6	9.8
6	8.0	....	5.2	12.6	10.7	15.5	4.5	5.0	4.8	6.2	6.4	9.2
7	7.4	5.3	....	16.6	10.6	13.4	4.4	4.6	4.6	5.8	6.2	9.4
8	7.5	....	5.2	24.6	10.9	12.0	4.3	4.3	4.6	5.5	10.5	9.4
9	7.6	5.3	....	23.6	10.6	11.6	4.1	4.1	4.4	5.3	12.0	8.6
10	6.6	....	5.3	19.2	10.5	10.5	3.8	4.1	4.5	5.4	12.8	7.9

Daily gage height, in feet, of Connecticut River at Orford, N. H., for 1912—**Continued.**

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	6.4	5.3	....	17.3	10.8	9.8	3.4	4.1	4.4	5.4	11.2	7.9
12	6.2	....	5.2	16.2	10.8	9.4	3.6	4.5	4.4	5.4	9.6	8.0
13	6.2	5.0	....	15.0	10.9	9.2	3.6	5.0	6.0	5.5	8.6	8.6
14	5.8	....	5.3	14.6	11.6	9.0	3.8	4.6	6.4	5.4	8.4	8.4
15	....	5.1	....	14.7	12.2	8.8	3.6	4.6	6.5	5.8	8.7	8.5
16	6.0	....	6.4	17.6	11.7	8.4	3.4	5.7	6.2	6.2	8.7	8.7
17	....	5.2	8.0	22.3	12.6	8.0	3.4	6.5	7.6	6.2	8.7	8.6
18	5.9	....	8.7	23.8	12.8	7.8	3.4	5.2	7.0	5.6	7.9	7.9
19	....	5.1	10.0	24.4	12.2	6.6	3.3	4.8	6.9	5.4	7.6	7.8
20	6.0	....	11.3	23.4	11.2	7.2	3.2	4.4	7.6	5.2	7.2	8.8
21	....	5.2	12.2	20.8	12.2	6.8	3.2	3.9	11.3	5.2	7.0	8.6
22	6.3	....	11.1	18.0	14.2	6.5	3.7	3.8	12.2	5.4	6.9	8.0
23	....	5.4	10.2	17.2	13.2	6.2	4.0	3.6	11.5	5.6	7.0	7.0
24	6.2	....	9.6	19.4	11.6	5.8	4.0	3.6	9.4	8.6	7.2	6.9
25	....	5.5	9.2	19.8	11.4	5.6	3.8	3.6	8.0	10.4	7.4	6.8
26	6.2	....	8.7	19.0	11.2	5.4	3.6	4.0	7.2	9.6	7.3	6.6
27	....	5.5	8.2	16.9	10.8	5.2	3.5	6.3	6.4	8.8	7.2	6.6
28	5.8	....	8.0	16.0	9.8	5.1	3.4	7.8	6.0	8.3	7.0	6.6
29	....	5.3	9.3	15.8	9.0	5.4	3.4	7.1	5.7	7.8	6.4	6.5
30	5.7	....	11.0	14.9	12.9	4.8	3.2	6.2	6.2	7.2	6.2	6.6
31	....	....	14.0	....	17.2	....	2.8	5.9	....	6.8	....	7.8

NOTE.—Relation between gage height and discharge affected by ice Jan. 7 to Apr. 7.

Daily discharge, in second-feet, of Connecticut River at Orford, N. H., for 1912.

[Drainage area, 3,300 square miles.]

Day.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,760	....	13,300	28,400	2,080	950	2,990	5,080	3,930	3,290
2	7,460	....	10,800	30,600	1,840	1,170	2,890	5,330	4,160	3,290
3	6,900	....	9,770	28,400	1,690	1,420	2,700	4,840	4,160	4,380
4	6,760	....	9,180	25,400	1,620	1,840	2,340	4,050	3,930	6,360
5	6,100	....	8,300	20,500	1,550	2,420	2,160	3,710	3,930	8,020
6	5,580	....	9,320	17,600	1,920	2,340	2,160	3,500	3,710	7,180
7	....	....	9,180	13,700	1,840	2,000	2,000	3,090	3,500	7,460
8	....	36,700	9,620	11,300	1,760	1,760	2,000	2,790	9,030	7,460
9	....	34,500	9,180	10,700	1,620	1,620	1,840	2,600	11,300	6,360
10	....	25,000	9,030	9,030	1,420	1,620	1,920	2,700	12,600	5,460
11	....	21,100	9,470	8,020	1,170	1,620	1,840	2,700	10,100	5,460
12	....	18,900	9,470	7,460	1,290	1,920	1,840	2,700	7,740	5,580
13	....	16,600	9,620	7,180	1,290	2,340	3,290	2,790	6,360	6,360
14	....	15,900	10,700	6,900	1,420	2,000	3,710	2,700	6,100	6,100
15	....	16,100	11,600	6,630	1,290	2,000	3,820	3,090	6,700	6,220
16	....	21,700	10,800	6,100	1,170	2,990	3,500	3,500	6,700	6,700
17	....	31,700	12,300	5,580	1,170	3,820	5,080	3,500	6,700	6,360
18	....	35,000	12,600	5,330	1,170	2,520	4,380	2,890	5,460	5,460
19	....	36,300	11,600	3,930	1,110	2,160	4,160	2,700	5,080	5,330
20	....	34,100	10,100	4,610	1,060	1,840	5,080	2,520	4,610	6,630
21	....	28,400	11,600	4,050	1,060	1,480	10,200	2,520	4,380	6,360
22	....	22,500	15,200	3,820	1,360	1,420	11,600	2,700	4,160	5,580
23	....	20,900	13,300	3,500	1,550	1,290	10,500	2,890	4,380	4,380
24	....	25,400	10,700	3,090	1,550	1,290	7,460	2,890	4,610	4,160
25	....	26,300	10,400	2,890	1,420	1,290	5,580	8,880	4,840	4,050
26	....	24,600	10,100	2,700	1,290	1,550	4,610	7,740	4,720	3,930
27	....	20,300	9,470	2,520	1,230	3,600	3,710	6,630	4,610	3,930
28	....	18,500	8,020	2,420	1,170	5,330	3,290	5,960	4,380	3,930
29	....	18,200	6,900	2,700	1,170	4,500	2,990	5,330	3,710	3,820
30	....	16,400	12,800	2,160	1,060	3,500	3,500	4,610	3,500	3,930
31	....	....	20,900	....	850	3,090	....	4,050	....	5,330

NOTE.—Daily discharge for open-water periods determined from a well-defined rating curve.

Monthly discharge of Connecticut River at Orford, N. H., for 1912.

[Drainage area, 3,300 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			3,110	0.942	1.09	C.
February			1,420	.430	.46	C.
March			3,840	1.16	1.34	D.
April	36,700		21,800	6.61	7.38	B.
May	20,900	6,900	10,800	3.27	3.77	A.
June	30,600	2,160	9,570	2.90	3.24	A.
July	2,080	850	1,390	.421	.49	A.
August	5,330	950	2,220	.673	.78	A.
September	11,600	1,840	4,100	1.24	1.38	A.
October	8,880	2,520	3,900	1.18	1.36	A.
November	12,600	3,500	5,640	1.71	1.91	A.
December	8,020	3,290	5,450	1.65	1.90	A.
The year	36,700	850	6,080	1.84	25.10	

NOTE.—Discharge Jan. 7 to Apr. 7, estimated from one discharge measurement, climatologic data and comparison records at Sunderland, Mass.

CONNECTICUT RIVER AT SUNDERLAND, MASS.

Location.—At the five-span steel highway bridge at Sunderland, Mass., on the road leading to South Deerfield, about 18 miles in a direct line and about 26 miles by river above the dam at Holyoke. Deerfield River enters the Connecticut from the west about 8 to 10 miles above the station.

Records available.—March 31, 1904, to December 31, 1912. From 1880 to 1899 a record of the discharge of this stream was maintained at Holyoke, Mass.

Drainage area.—7,700 square miles.

Gage.—Chain gage attached to highway bridge; read twice daily.

Channel.—Deep; coarse gravel; subject to change.

Discharge measurements.—Made from highway bridge.

Artificial control.—The first dam is about 12 miles above the station at Turners Falls, Mass.; the next about 29 miles above, near Hinsdale, N. H. There are others farther upstream and also on Deerfield, Millers, and other tributaries that operate to affect, more or less, the normal flow of the stream.

Winter flow.—During portions of December and up to early March relation of gage height to discharge is considerably affected by ice.

Accuracy.—Discharge rating curve fairly well defined; open-water estimates considered good.

Cooperation.—Station maintained in cooperation with several New England power companies.

Discharge measurements of Connecticut River at Sunderland, Mass., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 12[a]	G. H. Canfield	4.39	3,130
13[a]	do	5.19	4,310

[a] Measurement made under complete ice cover, just above bridge.

Daily gage height, in feet, of Connecticut River at Sunderland, Mass., for 1912.

[V. Lawer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.4	6.2	5.8	15.4	12.0	15.8	2.2	2.4	3.3	4.3	6.6	6.5
2	8.8			17.6	10.9	16.6	3.8	2.9	2.8	4.8	6.4	4.3
3	8.6	6.2		15.8	9.9	16.5	3.8	3.1	3.8	5.4	8.2	5.8
4	8.6			13.0	9.1	16.5	3.4	2.4	4.2	5.2	6.7	9.4
5	8.4		5.4	11.2	9.1	15.1	1.8	1.9	4.2	5.0	6.3	8.8
6	8.3	5.6		13.5	6.3	13.4	2.1	2.5	4.0	4.6	5.8	9.0
7	8.2		5.6	19.2	8.6	11.9	1.6	3.0	4.0	4.4	6.0	9.9
8	7.3	6.0		23.5	9.0	11.0	1.6	3.0	3.6	4.2	8.0	9.4
9	7.6		5.8	24.6	8.9	10.2	3.2	3.0	3.3	4.1	12.2	8.0
10	7.4	6.0		21.5	9.0	7.4	3.2	2.9	3.6	4.2	12.5	7.4
11	7.4	4.2	6.0	18.2	8.6	8.0	3.0	2.8	3.8	4.2	9.7	6.6
12	7.2			16.1	8.2	7.2	3.1	2.8	3.6	4.0	9.6	6.4
13		5.1	7.4	14.9	8.5	6.8	3.2	3.7	3.6	2.6	8.4	6.0
14	6.2		9.0	14.6	8.7	6.8	2.4	3.8	3.4	3.0	8.4	6.0
15		5.0	9.4	14.3	8.8	6.6	2.2	3.7	2.6	4.1	9.6	5.8
16			14.0	15.0	9.0	6.4	2.5	3.8	4.2	4.3	9.2	5.4
17	6.8	4.9	15.8	18.8	12.2	4.9	2.2	3.9	6.1	4.2	10.6	5.7
18			14.8	20.1	13.9	5.8	2.2	3.2	5.6	4.2	6.0	5.6
19			17.8	20.4	12.1	5.4	2.7	3.8	5.5	4.1	7.2	5.4
20	6.8	5.2	15.8	20.8	10.6	5.4	3.4	4.2	5.3	3.2	6.8	6.4
21			14.8	19.4	10.1	5.1	2.6	4.1	6.6	3.7	6.8	7.4
22	7.8	5.8	12.3	17.6	11.4	4.8	2.4	3.6	6.9	4.4	6.2	8.0
23			10.5	16.3	13.1	3.6	2.6	3.2	8.0	6.3	6.4	4.8
24	7.6	5.9	9.4	16.4	12.1	4.4	2.8	3.0	8.0	15.2	8.1	5.1
25			8.2	16.0	10.8	4.6	2.9	2.7	7.0	17.6	4.8	6.7
26			7.7	15.6	9.9	4.5	3.4	2.4	5.7	15.4	6.0	7.7
27	6.6	6.0	7.3	14.8	8.6	4.4	3.4	2.7	5.0	13.4	6.3	7.1
28			7.0	13.8	8.6	4.4	2.6	3.0	4.6	8.0	6.0	7.3
29			8.7	12.2	7.9	4.2	2.3	3.7	4.7	8.8	5.8	7.0
30	6.2		14.2	12.5	9.3	2.4	2.2	4.0	3.9	7.4	5.7	6.4
31			14.6		14.4		1.8	4.4		7.2		9.1

NOTE.—Relation between gage height and discharge affected by ice, Jan. 11 to Mar. 19.

Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	18,500			46,800	32,300	48,500	2,450	2,720	4,210	6,270	12,500	12,200
2	19,900			56,600	28,000	52,100	5,200	3,500	3,330	7,420	11,900	6,270
3	19,200			48,500	24,100	51,600	5,200	3,850	5,200	8,920	17,800	10,000
4	19,200			36,400	21,000	51,600	4,400	2,720	6,050	8,400	12,800	22,200
5	18,500			29,100	21,000	45,400	1,960	2,080	6,050	7,900	11,600	19,900
6	18,200			38,500	11,600	38,100	2,320	2,870	5,620	6,950	10,000	20,700
7	17,800			63,900	19,200	31,900	1,740	3,670	5,620	6,490	10,600	24,100
8	14,800			83,700	20,700	28,300	1,740	3,670	4,790	6,050	17,100	22,200
9	15,800			88,800	20,300	25,200	4,030	3,670	4,210	5,830	33,100	17,100
10	15,100			74,500	20,700	15,100	4,030	3,500	4,790	6,050	34,300	15,100
11				59,300	19,200	17,100	3,670	3,330	5,200	6,050	23,300	12,500
12		3,130		49,800	17,800	14,400	3,850	3,330	4,790	5,620	22,900	11,900
13		4,310		44,600	18,900	13,100	4,030	4,990	4,790	3,020	18,500	10,600
14				43,200	19,600	13,100	2,720	5,200	4,400	3,670	18,500	10,600
15				41,900	19,900	12,500	2,450	4,990	3,020	5,830	22,900	10,000
16				45,000	20,700	11,900	2,870	5,200	6,050	6,270	21,400	8,920
17				62,100	33,100	7,660	2,450	5,410	11,000	6,050	26,800	9,760
18				68,100	40,200	10,000	2,450	4,030	9,470	6,050	10,600	9,470
19				69,400	32,700	8,920	3,170	5,200	9,190	5,830	14,400	8,920
20			48,500	71,300	26,800	8,920	4,400	6,050	8,660	4,030	13,100	11,900
21			44,100	64,800	24,800	8,150	3,020	5,830	12,500	4,990	13,100	15,100
22			33,500	56,600	29,900	7,420	2,720	4,790	13,500	6,490	11,200	17,100
23			26,400	50,800	36,800	4,790	3,020	4,030	17,100	11,600	11,900	7,420
24			22,200	51,200	32,700	6,490	3,330	3,670	17,100	45,900	17,500	8,150
25			17,800	49,400	27,600	6,950	3,500	3,170	13,800	56,600	7,420	12,800
26			16,100	47,600	24,100	6,720	4,400	2,720	9,760	46,800	10,600	16,100
27			14,800	44,100	19,200	6,490	4,400	3,170	7,900	38,100	11,600	14,100
28			13,800	39,800	19,200	6,490	3,020	3,670	6,950	17,100	10,600	14,800
29			19,600	33,100	16,800	6,050	2,580	4,990	7,180	19,900	10,000	13,800
30			41,500	34,300	21,800	2,720	2,450	5,620	5,410	15,100	9,760	11,900
31			43,200		42,400		1,960	6,490		14,400		21,000

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Connecticut River at Sunderland, Mass., for 1912.

[Drainage area, 7,700 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			9,000	1.17	1.35	D.
February			5,000	.649	.70	D.
March			11,000	1.43	1.65	D.
April	88,800	29,100	53,100	6.90	7.70	B.
May	42,400	11,600	24,600	3.19	3.68	A.
June	52,100	2,720	18,900	2.45	2.73	A.
July	5,200	1,740	3,210	.417	.48	A.
August	6,490	2,080	4,130	.536	.62	A.
September	17,100	3,020	7,590	.986	1.10	A.
October	56,600	3,020	12,900	1.68	1.94	A.
November	34,300	7,420	15,900	2.06	2.30	A.
December	24,100	6,270	13,800	1.79	2.06	A.
The year	88,800	1,740	14,900	1.94	26.31	

NOTE.—Discharge Jan. 11 to Mar. 19, inclusive, estimated from two discharge measurements, climatologic data and comparison with records at Orford, N. H.

PASSUMPSIC RIVER NEAR ST. JOHNSBURY, VT.

Location.—At suspension footbridge just below dam of Pierce's mills, about 5 miles above St. Johnsbury, 2 miles below the mouth of Sheldon Branch, 4 miles above the mouth of Moose River, and 5 miles above the mouth of Sleepers River.

Records available.—May 26, 1909, to December 31, 1912. A station was established June 29, 1903, on Passumpsic River at St. Johnsbury Center, but was discontinued November 30 of the same year because of backwater from the dam at St. Johnsbury.

Drainage area.—237 square miles.

Gage.—Staff, in two sections; low-water section a vertical staff bolted to ledge just above bridge; high-water section an inclined staff bolted to ledge just below bridge.

Channel.—Semipermanent; bed composed chiefly of gravel, but near right bank consists of a rock ledge.

Discharge measurements.—At high stages made from downstream side of bridge; at low stages, by wading 200 feet below.

Winter flow.—River freezes over under the bridge and at control point 300 feet below; relation of gage height to discharge is therefore affected by ice.

Artificial control.—Discharge affected by the operation of Pierce's mills, just above station, and by other mills farther upstream. The storage at Pierce's mills is small and the use of water nearly uniform during the day and night, so that the daily gage readings are fairly accurate indices of the daily discharge.

Accuracy.—The discharge rating curve is well defined.

Discharge measurements of Passumpsic River near St. Johnsbury, Vt., for 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 23[a]	G. H. Canfield	2.73	196
Aug. 24	J. G. Mathers	1.75	177
24	do	1.69	162
Oct. 17	C. S. De Golyer	1.90	219

[a] Made under complete ice cover 200 feet below bridge.

Daily gage height, in feet, of Passumpsic River near St. Johnsbury, Vt., for 1912.

[Joseph Cox, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.6	2.5	4.9	3.4	6.6	1.60	1.48	1.55	2.2	2.0	2.05
2	2.5	2.6	2.5	3.6	3.3	4.3	1.58	1.39	1.60	2.2	2.55	2.15
3	2.35	2.5	2.4	3.1	3.1	4.6	1.55	1.74	1.58	1.98	2.15	4.1
4	2.4	2.5	2.45	2.85	3.0	4.0	1.50	1.99	1.59	1.90	2.0	2.9
5	2.3	2.5	2.5	2.4	2.85	4.2	1.56	1.68	1.52	1.86	1.99	2.6
6	2.45	2.4	2.5	4.0	3.3	3.4	1.59	1.58	1.65	1.80	1.98	3.0
7	2.65	2.4	2.45	7.0	3.4	3.9	1.60	1.59	1.62	1.76	2.1	3.2
8	3.0	2.5	2.4	10.2	3.0	3.2	1.45	1.48	1.84	1.80	5.8	2.55
9	2.65	2.5	2.5	5.0	2.9	2.9	1.46	1.45	1.58	1.69	3.7	2.1
10	2.7	2.35	......	4.0	2.85	2.7	1.44	1.42	1.54	1.78	2.95	2.4
11	2.8	2.3	2.5	3.9	2.75	2.9	1.42	1.62	2.85	1.76	2.65	2.35
12	2.8	2.5	2.5	4.2	2.6	2.6	1.42	1.80	2.85	1.81	2.5	2.15
13	2.7	2.4	2.5	4.3	2.8	2.8	1.41	1.73	1.84	2.8	2.45	2.0
14	2.6	2.5	2.7	4.4	4.3	2.6	1.50	1.49	1.55	2.2	3.3	1.98
15	2.55	2.45	2.7	5.6	3.2	2.4	1.52	1.49	1.60	2.05	3.3	2.0
16	2.6	2.4	2.8	10.5	2.8	2.5	1.50	1.46	2.8	2.05	2.8	2.05
17	2.6	2.45	3.1	9.8	4.0	2.7	1.44	1.38	1.95	1.96	2.5	2.05
18	2.5	2.3	3.0	6.8	3.7	2.4	1.36	1.28	1.71	1.88	2.35	1.98
19	2.5	2.45	3.4	6.6	2.95	2.2	1.38	1.48	3.5	1.84	2.35	2.75
20	2.65	2.45	4.1	5.6	2.7	2.1	1.45	1.41	3.8	2.0	2.4	3.2
21	2.5	2.4	3.2	5.0	4.8	2.1	1.36	1.41	3.4	1.88	2.35	2.3
22	2.6	2.55	3.0	5.2	3.7	2.0	1.84	1.38	2.5	1.80	2.4	2.2
23	2.55	2.6	2.55	8.7	3.5	1.91	1.66	1.34	2.15	1.84	2.4	2.4
24	2.5	2.65	2.5	5.9	3.1	1.86	1.45	1.7	2.1	4.7	2.3	2.2
25	2.5	2.5	2.5	4.8	3.2	1.76	1.39	2.15	1.96	3.4	2.3	2.3
26	2.6	2.5	2.1	4.7	2.75	2.1	1.36	2.1	1.82	2.9	2.8	2.3
27	2.4	2.55	2.4	5.0	2.6	1.91	1.34	2.2	1.72	2.6	2.2	2.2
28	2.4	2.6	2.25	4.6	2.4	1.78	1.30	1.81	1.70	2.35	2.1	......
29	2.55	2.5	3.6	3.8	2.4	1.72	1.45	1.62	1.81	2.2	1.92	2.1
30	2.5	......	6.3	3.5	7.1	1.61	1.51	1.59	2.85	2.15	2.15	......
31	2.5	......	5.0	......	7.3	......	1.48	1.49	......	2.05	......	3.1

NOTE.—Daily gage heights, Jan. 1 to Mar. 31, affected by ice. Gage heights for the first few days in April probably somewhat affected also.

Daily discharge, in second-feet, of Passumpsic River near St. Johnsbury, Vt., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	......	1,430	777	2,180	141	111	129	315	250	266
2	......	......	......	863	735	1,164	136	92	141	315	438	298
3	......	......	......	651	651	1,290	129	176	136	244	298	1,080
4	......	......	......	550	610	1,040	117	247	139	220	250	570
5	......	......	......	384	550	1,120	131	161	122	209	247	456
6	......	......	......	1,040	735	777	139	136	154	192	244	610
7	......	......	......	2,360	777	992	141	139	146	182	282	693
8	......	......	......	3,800	610	693	106	111	203	192	1,820	438
9	......	......	......	1,470	570	570	108	106	136	164	906	282
10	......	......	......	1,040	550	493	103	99	127	187	590	384
11	......	......	......	992	512	570	100	146	550	182	474	366
12	......	......	......	1,120	456	456	100	192	550	195	420	298
13	......	......	......	1,160	531	531	96	174	203	531	402	250
14	......	......	......	1,210	1,160	456	117	115	129	315	735	244
15	......	......	......	1,740	693	384	122	115	141	266	735	250
16	......	......	......	3,940	531	420	117	108	531	266	531	266
17	......	......	......	3,620	1,040	493	103	90	235	238	420	266
18	......	......	......	2,280	906	384	85	68	169	214	366	244
19	......	......	......	2,180	590	315	90	111	820	203	366	512
20	......	......	......	1,740	493	282	106	96	949	250	384	693
21	......	......	......	1,470	1,380	282	85	96	777	214	366	349
22	......	......	......	1,560	906	250	203	90	420	192	384	315
23	......	196	......	3,130	820	223	156	81	298	203	384	384
24	......	......	......	1,870	651	209	106	166	282	1,340	349	315
25	......	......	......	1,380	693	182	92	298	238	777	349	349
26	......	......	......	1,340	512	282	85	282	198	570	349	349
27	......	......	......	1,470	456	223	81	315	171	456	315	315
28	......	......	......	1,290	384	187	72	195	166	366	282	300
29	......	......	......	949	384	171	106	146	195	315	226	282
30	......	......	......	820	2,410	144	119	139	550	298	298	280
31	......	......	......	......	2,500	......	111	115	......	266	......	651

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge for the first few days in April probably somewhat doubtful because of ice effect. Discharge Dec. 28 and 30 estimated.

Monthly discharge of Passumpsic River near St. Johnsbury, Vt., for 1912.

[Drainage area, 390 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
April	3,940	384	1,630	4.18	4.66	A.
May	2,500	384	793	2.03	2.34	A.
June	2,180	144	559	1.43	1.60	A.
July	203	72	113	.290	.33	B.
August	315	68	146	.374	.43	B.
September	949	122	300	.769	.86	A.
October	1,340	164	319	.818	.94	A.
November	1,820	226	449	1.15	1.28	A.
December	1,080	244	399	1.02	1.18	A.

WHITE RIVER NEAR SHARON, VT.

Location.—About 1,500 feet below the dam of the Vermont Copper Co., near Sharon, Vt., and about 800 feet above the Central Vermont Railway bridge.

Records available.—May 13, 1909, to December 31, 1912.

Drainage area.—686 square miles.

Gage.—An inclined staff reading to 10 feet, attached to a large rock on the left bank. A chain gage for use at high stages is nailed to trees about 80 feet upstream from the staff gage.

Channel.—Divided by an island above the gages.

Discharge measurements.—Formerly made from two suspension bridges which connect the island with the banks. These bridges were washed out in 1911 and were not replaced.

Artificial control.—There are several power plants above the station, but it was assumed that fluctuations in daily stage caused by operation of these plants was sufficiently equalized at the dam of the Vermont Copper Co., until 1912, when the power plant was put into operation.

Winter flow.—Affected by ice.

Accuracy.—A fairly good rating curve has been established for this station, so that the accuracy of the computed discharge depends entirely on the accuracy of mean daily gage heights. The published gage heights do not represent the mean, as the gage was read but once a day, and the discharge figures represent the flow only at the time the gage was read.

Discharge measurements of White River near Sharon, Vt., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 17[a]	G. H. Canfield	[b]5.25	431
Sept. 2[c]	J. G. Mathers	3.45	162

[a] Made under complete ice cover in left channel and partial ice cover in right channel.
[b] Crest gage, 102.82 feet.
[c] Made by wading at head of island.

Gage height, in feet, and discharge, in second-feet, of White River near Sharon, Vt., for 1912.

[C. H. Tucker, observer.]

Day.	January.		February.		March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	4.5						7.8	6,420	5.4	1,970		
2	4.5						6.3	3,380	5.1	1,560		
3	4.6						5.7	2,410	5.1	1,560	6.2	3,200
4	4.5								5.0	1,430	5.8	2,560
5	4.5						5.2	1,700	5.1	1,560	5.6	2,260
6	4.6						9.0	9,080			5.3	1,830
7	4.8						9.9	11,200	5.0	1,430	5.3	1,830
8	5.0						14.4		4.9	1,300		
9	5.0						8.6	8,180	4.8	1,180	4.9	1,300
10	5.0										4.8	1,180
11	5.2						6.3	3,380	4.6	965		
12							6.3	3,380	4.5	865	4.6	965
13							6.5	3,740				
14									4.7	1,070	4.5	865
15							6.7	4,130			4.4	770
16							9.4	10,000	4.6	965	4.3	680
17							9.2	9,540	6.8	4,320	4.3	680
18											4.3	680
19							9.6	10,500	5.4	1,970	4.2	595
20					6.8						4.1	515
21							6.7	4,130			4.1	515
22					5.3		6.6	3,940	7.2	5,140	4.0	440
23					5.1		8.0	6,850			3.9	370
24					5.0				5.8	2,560	3.8	310
25							6.4	3,560			3.7	255
26							6.1	3,040			3.6	210
27					4.5		6.1	3,040	5.0	1,430	3.7	255
28					4.5		5.9	2,720			3.6	210
29					6.0	2,870	5.7	2,410	4.7	1,070		
30					7.3	5,350			7.9	6,630	3.6	210
31									8.5	7,960		

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1					3.3	104	4.1	515				
2	3.5	175	3.5	175					4.3	680	4.1	515
3												
4	3.5	175	3.3	104	3.6	210	3.9	370	4.65	1,020		
5	3.4	140										
6											5.1	1,560
7	3.5	175	3.4	140			3.8	310				
8	3.5	175			4.7	1,070			6.4	3,560	5.0	1,430
9	3.4	140	3.4	140								
10	3.35	122							5.3	1,830		
11			3.3	104			3.7	255				
12											4.4	770
13	3.35	122										
14			3.4	140	3.5	175	4.3	680	5.3	1,830		
15	3.5	175										
16											4.4	770
17	3.4	140			4.1	515						
18			3.4	140			3.9	370	4.8	1,180		
19	3.4	140					4.0	440			5.0	1,430
20			3.5	175								
21					4.9	1,300			4.5	865	4.5	965
22					4.4	770						
23	3.9	370	3.5	175			13.1					
24	3.7	255							4.4	770	4.2	595
25			3.3	104								
26					3.9	370	6.0	2,870				
27	3.4	140										
28	3.35	122							4.3	680		
29	3.3	104	3.5	175							4.2	595
30							4.7	1,070	4.1	515		
31	3.2	74									5.3	1,830

NOTE.—Relation of gage height to discharge affected by ice Jan. 12 to Mar. 28. Daily discharge obtained from a fairly well defined rating curve applicable to readings on the staff gage below the dam. See "Accuracy" in station description.

DEERFIELD RIVER AT HOOSAC TUNNEL, MASS.

Location.—At wooden highway bridge near Hoosac Tunnel railroad station, about 4½ miles below the mouth of Dunbar Brook, 4 miles above Pelham Brook, and 4 miles above Cold Brook.

Records available.—August 8, 1909, to December 31, 1912. A measurement was made at the bridge October 29, 1906.

Drainage area.—257 square miles.

Gage.—Chain, fastened to left-hand downstream side of bridge; datum unchanged.

Channel.—Permanent. The bed is of coarse gravel and is very rough.

Discharge measurements.—At high stages made from upstream side of highway bridge; at low stages by wading.

Winter flow.—Relation of gage height to discharge is affected by ice, as the river freezes completely over.

Artificial control.—The operation of numerous mills on the main river and its tributaries above the station completely controls the flow of the river except at high stages and causes considerable fluctuations in gage heights during the day. The nearest mill is at Monroe Bridge about 7 miles upstream. For this reason it is not advisable to attempt to estimate the mean daily discharge from semidaily gage readings. The gage reader's observations are being published, together with the rate of flow corresponding to each.

Discharge measurements of Deerfield River at Hoosac Tunnel, Mass., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 11	C. A. Moore	3.28	203	Mar. 6	Alexander McMillan	2.68	123
Feb. 15	G. H. Canfield	3.32	241	6	.....do	3.00	152
16	.....do	2.44	123	13	.....do	3.66	359

NOTE.—All measurements made 100 feet below the highway bridge and under complete ice cover. Gage heights affected by ice.

Gage height, in feet, and discharge, in second-feet, of Deerfield River at Hoosac Tunnel, Mass., for 1911–12.

[Mary A. Galbraith, observer.]

Day.	April.						Day.	April—Continued.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.		Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*		*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.50	2.92	719	5.40	2.78	620	16	7.30	5.78	4,100	5.30	4.58	2,330
2	7.30	2.48	440	5.30	2.58	495	17	7.45	4.38	2,090	5.45	4.08	1,750
3	7.25	2.4	398	5.40	2.68	555	18	7.30	3.78	1,440	5.25	3.68	1,340
4	7.20	2.18	300	5.45	2.5	450	19	7.50	3.68	1,340	5.50	3.78	1,440
5	7.50	2.22	317	5.20	2.48	440	20	7.45	3.58	1,250	5.20	3.78	1,440
6	7.35	2.98	765	5.25	4.98	2,860	21	7.30	3.48	1,160	5.45	3.88	1,540
7	7.30	5.98	4,460	5.45	6.38	5,250	22	7.15	3.98	1,640	5.55	3.68	1,340
8	7.35	5.18	3,160	5.50	5.18	3,160	23	7.35	3.78	1,440	5.35	3.58	1,250
9	7.40	4.48	2,210	5.35	4.28	1,970	24	7.50	3.48	1,160	6.00	3.78	1,440
10	7.20	3.78	1,440	5.15	3.68	1,340	25	7.20	4.4	2,110	5.30	4.52	2,250
11	7.20	3.28	1,000	6.55	3.58	1,250	26	7.20	4.98	2,860	5.25	4.8	2,610
12	7.50	3.18	924	5.30	3.38	1,080	27	7.15	5.18	3,160	5.15	5.1	3,040
13	7.15	3.38	1,080	5.35	3.88	1,540	28	7.25	5.55	3,720	6.10	5.9	4,310
14	7.35	4.08	1,750	5.25	4.58	2,330	29	7.35	5.58	3,770	6.30	5.8	4,130
15	7.20	5.98	4,460	5.50	5.58	3,770	30	7.45	5.3	3,340	5.20	4.92	2,780

Gage height, in feet, and discharge, in second-feet, of Deerfield River at Hoosac Tunnel, Mass., for 1911–12—Continued.

Day.	May.						June.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	5.1	3,040	5.45	4.88	2,720	7.40	1.7	147	5.45	2.28	342
2	7.35	6.8	6,150	5.45	5.98	4,460	7.35	2.42	408	5.40	2.28	342
3	7.50	4.98	2,860	5.45	4.58	2,330	7.45	1.88	196	5.45	1.95	218
4	7.15	4.18	1,860	5.45	3.88	1,540	7.30	2.08	262	5.35	1.72	152
5	7.10	3.78	1,440	5.50	3.68	1,340	7.30	1.48	99	5.40	1.92	208
6	7.50	3.58	1,250	5.50	3.32	1,040	7.35	1.62	129	5.30	1.68	142
7	7.50	2.98	765	6.00	2.58	495	7.30	2.22	317	5.30	3.78	1,440
8	7.50	2.98	765	5.50	2.08	262	7.30	3.52	1,200	5.25	3.18	920
9	7.45	2.7	567	5.45	2.78	620	7.35	2.68	555	5.30	2.62	518
10	7.40	2.6	506	5.40	2.5	450	7.30	2.58	495	5.40	2.52	461
11	7.45	2.22	317	5.35	2.35	374	7.45	2.38	389	5.30	2.28	342
12	7.30	2.38	389	5.55	2.3	351	7.40	2.7	567	5.30	2.88	690
13	7.25	2.5	450	5.25	2.48	440	7.35	5.08	3,010	5.35	4.48	2,210
14	7.35	2.3	351	5.45	2.28	342	7.35	4.08	1,750	5.35	3.68	1,340
15	7.40	2.22	317	5.45	2.18	300	7.40	3.38	1,080	5.35	3.28	1,000
16	7.45	2.32	360	5.50	2.08	262	7.35	3.28	1,000	5.40	2.88	690
17	7.35	2.1	269	5.30	1.98	228	7.20	2.78	620	5.30	2.7	567
18	7.40	2.0	234	5.30	1.7	147	7.40	2.48	440	5.30	2.42	408
19	7.35	2.18	300	5.45	2.48	440	7.30	2.3	351	5.40	2.2	308
20	7.30	2.3	351	5.40	2.32	360	7.30	2.32	360	5.30	2.25	330
21	7.40	2.32	360	5.30	2.18	300	7.35	2.2	308	5.30	2.1	269
22	7.35	2.35	374	5.40	2.22	317	7.30	1.9	202	5.30	2.15	288
23	7.35	2.18	300	5.35	1.98	228	7.30	1.8	173	5.30	2.0	234
24	7.40	2.0	234	5.30	2.08	262	7.35	1.5	103	5.40	1.85	188
25	7.45	1.92	208	5.50	2.12	277	7.40	1.3	67	5.30	1.5	103
26	7.30	1.98	228	5.30	2.22	317	7.30	1.88	196	5.30	2.0	234
27	7.45	2.08	262	5.35	1.98	228	7.30	1.92	208	5.30	2.4	398
28	7.40	1.82	179	5.40	1.8	173	7.35	1.95	218	5.30	2.1	269
29	7.35	1.78	168	5.30	1.5	103	7.30	1.9	202	5.25	1.8	173
30	7.40	1.48	99	5.35	1.5	103	7.30	1.98	228	5.30	1.5	103
31	7.35	1.5	103	5.40	1.98	228	......	......	......	......	......	......

Day.	July.						August.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	1.5	103	5.30	1.52	107	7.30	1.35	76	5.35	1.35	76
2	7.40	1.7	147	5.45	1.1	39	7.30	1.45	94	5.30	1.32	70
3	7.35	1.3	67	4.00	1.7	147	7.35	1.35	76	5.35	1.3	67
4	7.40	1.8	173	5.40	1.2	52	7.35	1.45	94	5.30	1.35	76
5	7.30	1.0	28	5.30	1.5	103	7.30	1.25	60	5.30	1.15	46
6	7.30	1.42	88	5.30	1.52	107	7.30	.95	24	5.30	1.05	34
7	7.35	1.0	28	5.35	1.48	99	7.30	1.25	60	5.30	1.35	76
8	7.30	1.05	34	5.30	1.4	84	7.30	1.28	64	5.30	1.25	60
9	7.40	1.0	28	5.35	1.3	67	7.30	1.65	136	5.30	1.4	84
10	7.30	1.0	28	5.40	1.45	94	7.30	1.32	70	5.40	1.35	76
11	7.35	1.55	114	5.35	1.3	67	7.30	1.25	60	5.30	1.15	46
12	7.30	1.0	28	5.40	1.5	103	7.30	1.38	81	5.30	1.38	81
13	7.35	1.3	67	5.35	.9	19	7.30	1.25	60	5.30	1.45	94
14	7.35	1.1	39	5.30	1.65	136	7.30	.95	24	5.30	1.35	76
15	7.30	1.02	30	5.30	1.52	107	7.30	1.05	34	5.30	.95	24
16	7.40	1.0	28	5.30	1.2	52	7.30	2.15	288	5.30	1.95	218
17	7.40	1.02	30	5.30	1.0	28	7.30	1.75	160	5.30	1.4	84
18	7.30	1.5	103	5.30	1.2	52	7.30	1.45	94	5.30	1.45	94
19	7.30	1.42	88	5.30	1.02	30	7.30	1.4	84	5.30	2.15	288
20	7.30	1.4	84	5.35	1.4	84	7.45	1.68	142	5.30	1.42	88
21	7.30	1.0	28	5.40	1.2	52	7.30	1.1	39	5.30	1.82	179
22	7.30	1.45	94	5.35	1.2	52	7.30	1.52	107	5.30	1.38	81
23	7.40	1.0	28	5.30	1.0	28	7.30	.95	24	5.30	1.38	81
24	7.30	1.1	39	5.30	1.5	103	7.30	1.35	76	5.30	.95	24
25	7.30	1.5	103	5.30	2.6	506	7.30	1.45	94	5.30	1.5	103
26	7.35	2.1	269	5.30	2.3	351	7.45	1.3	67	5.30	1.9	202
27	7.30	1.5	103	5.30	1.5	103	7.30	1.85	188	5.30	1.45	94
28	7.30	1.42	88	5.30	1.5	103	7.30	1.45	94	5.30	1.85	188
29	7.35	1.52	107	5.30	2.3	351	7.30	4.95	2,820	5.30	3.95	1,610
30	7.40	1.22	55	5.30	2.1	269	7.30	3.08	844	5.30	2.65	536
31	7.30	1.8	173	5.30	2.0	234	7.30	2.45	424	5.30	2.38	389

Gage height, in feet, and discharge, in second-feet, of Deerfield River at Hoosac Tunnel, Mass., for 1911–12—Continued.

Day.	September.						October.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	2.12	277	5.30	2.3	351	7.30	2.9	704	5.40	2.82	647
2	7.30	1.92	208	5.30	1.75	160	7.30	4.05	1,720	5.30	3.85	1,510
3	7.40	2.0	234	5.30	2.6	506	7.30	3.45	1,140	5.30	3.25	980
4	7.30	2.4	398	5.30	2.25	330	7.30	2.85	668	5.30	4.95	2,820
5	7.30	1.95	218	5.30	2.15	288	7.30	4.4	2,110	4.00	3.92	1,580
6	7.30	2.0	234	5.30	3.25	980	8.00	3.32	1,040	4.00	3.2	940
7	7.30	3.2	940	5.30	2.85	668	8.00	3.1	860	4.00	3.12	876
8	7.30	2.65	536	5.30	3.45	1,140	7.00	3.35	1,060	3.30	3.28	1,000
9	7.30	3.15	900	5.30	5.75	4,040	8.00	3.3	1,020	4.00	3.22	956
10	7.30	4.55	2,290	5.30	3.8	1,460	8.00	3.18	924	4.00	3.05	820
11	7.30	3.3	1,020	5.30	2.9	704	8.00	2.82	647	4.00	2.78	620
12	7.30	2.55	478	5.30	2.45	424	8.00	2.58	495	4.00	2.6	506
13	7.30	2.4	398	5.30	2.25	330	8.00	2.4	398	4.00	2.45	424
14	7.30	2.05	252	5.30	2.12	277	8.00	2.28	342	4.00	2.22	317
15	7.30	1.65	136	5.30	2.45	424	7.00	2.3	351	2.30	2.32	360
16	7.30	3.05	820	5.30	2.95	742	8.00	2.12	277	4.00	2.25	330
17	7.30	2.75	600	5.30	2.45	424	8.00	2.1	269	4.00	2.12	277
18	7.30	2.3	351	5.30	2.15	288	8.00	2.28	342	4.00	5.3	3,340
19	7.30	2.05	252	5.30	2.2	308	8.00	7.45	7,650	4.00	6.75	6,040
20	7.30	2.12	277	5.30	1.85	188	8.00	5.5	3,640	4.00	4.98	2,860
21	7.30	2.15	288	5.30	1.75	160	8.00	4.3	1,990	4.00	4.35	2,050
22	7.30	2.2	308	5.30	2.55	478	7.00	5.38	3,460	3.00	4.98	2,860
23	7.30	2.6	506	5.30	2.45	424	8.00	5.28	3,310	4.00	5.1	3,040
24	7.45	2.1	269	5.30	2.55	478	8.00	4.3	1,990	4.00	4.1	1,770
25	7.30	2.5	450	5.30	2.35	374	8.00	3.65	1,320	4.00	3.42	1,120
26	7.30	2.3	351	5.30	2.15	288	8.00	3.2	940	4.00	3.18	924
27	7.30	2.15	288	5.30	2.08	262	8.00	2.92	719	4.00	2.9	704
28	7.30	2.4	398	5.30	2.42	408	8.00	2.75	600	4.00	2.72	580
29	7.30	2.3	351	5.30	2.6	506	7.00	2.65	536	3.00	2.6	506
30	7.30	3.75	1,410	5.30	3.35	1,060	8.00	2.5	450	4.00	2.48	440
31	......	......	......	......	......	......	8.00	2.48	440	4.00	2.65	536

Day.	November.						December.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	8.00	3.35	1,060	4.00	3.2	940	8.00	3.25	980	4.00	3.0	780
2	8.00	3.0	780	4.00	2.88	690	8.00	2.9	704	4.00	2.95	742
3	8.00	2.6	506	4.00	2.62	518	7.00	2.62	518	3.00	2.5	450
4	8.00	2.72	580	4.00	2.6	506	8.00	2.32	360	4.00	2.3	351
5	7.00	2.28	342	3.00	2.4	398	8.00	2.22	317	4.00	2.18	300
6	8.00	2.38	389	4.00	2.5	450	8.00	2.35	374	4.00	2.15	288
7	8.00	3.2	940	4.00	3.25	980	8.00	2.35	374	4.00	2.28	342
8	8.00	3.55	1,220	4.00	3.42	1,120	8.00	2.45	424	4.00	2.38	389
9	8.00	3.1	860	4.00	3.0	780	8.00	2.15	288	4.00	2.35	374
10	8.00	2.88	690	4.00	2.98	765	7.00	2.4	398	3.00	2.45	424
11	8.00	3.05	820	4.00	3.08	844	8.00	2.42	408	4.00	2.28	342
12	7.00	2.95	742	3.00	2.7	567	8.00	2.8	633	4.00	2.95	742
13	8.00	3.88	1,540	4.00	3.42	1,120	8.00	3.08	844	4.00	3.12	876
14	8.00	3.1	860	4.00	3.05	820	8.00	3.0	780	4.00	2.95	742
15	8.00	2.98	765	4.00	2.95	742	8.00	2.85	668	4.00	2.88	690
16	8.00	2.68	555	4.00	2.8	633	8.00	2.85	668	4.00	2.98	765
17	8.00	2.58	495	4.00	2.48	440	7.30	3.6	1,270	3.00	3.8	1,460
18	8.00	2.85	668	4.00	4.25	1,940	8.00	3.38	1,080	4.00	3.2	940
19	7.00	4.2	1,880	3.00	3.9	1,560	8.00	2.65	536	4.00	2.7	567
20	8.00	3.5	1,180	4.00	3.45	1,140	8.00	2.4	398	4.00	2.3	351
21	8.00	3.22	956	4.00	2.9	704	8.00	2.22	317	4.00	2.38	389
22	8.00	2.82	647	4.00	2.72	580	8.00	2.5	450	4.00	2.55	478
23	8.00	2.5	450	4.00	2.55	478	8.00	4.2	1,880	4.00	6.25	4,990
24	8.00	2.78	620	4.00	2.82	647	7.00	4.65	2,420	12.20	4.5	2,230
25	8.00	2.75	600	4.00	2.7	567	7.00	4.0	1,660	1.10	3.9	1,560
26	7.00	2.5	450	3.00	2.42	408	7.00	3.6	1,270	12.45	3.5	1,180
27	8.00	2.32	360	4.00	2.38	389	7.00	4.0	1,660	1.10	3.6	1,270
28	8.00	2.48	440	4.00	2.42	408	7.00	3.5	1,180	1.10	3.4	1,100
29	8.00	4.95	2,820	4.00	4.5	2,230	8.00	2.32	360	4.00	2.3	351
30	8.00	3.72	1,380	4.00	3.58	1,250	8.00	2.45	424	4.00	2.52	461
31	......	......	......	......	......	......	7.00	2.5	450	3.00	2.35	374

Gage height, in feet, and discharge, in second-feet, of Deerfield River at Hoosac Tunnel, Mass., for 1911–12—Continued.

Day.	January.						February.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	8.00	2.45	424	4.00	2.48	440						
2	8.00	2.3	351	4.00	2.32	360						
3	8.00	2.35	374	4.00	2.32	360						
4	8.00	2.22	317	4.00	2.2	308						
5	8.00	2.12	277	4.00	2.28	342						
6												
7												
8	10.00	2.7	144									
9												
10												
11												
12												
13												
14				2.00	2.85	160						
15										3.00	3.35	254
16										3.00	3.3	240
17										3.00	3.15	207
18	10.00	3.15	207	5.00	2.85	160				3.00	3.0	180
19				2.00	3.25	228				3.00	3.1	197
20	8.00	3.7	372	12.00	4.3	690				3.00	2.9	166
21	8.00	4.0	513							3.00	2.85	160
22										3.00	3.4	267
23										3.00	3.45	282
24										3.00	3.65	352
25	10.00	3.5	298							3.00	3.55	316
26										3.00	3.5	298
27	10.00	3.4	267							3.00	3.55	316
28										3.00	3.5	298
29										3.00	3.55	316
30												
31												

Day.	March.						April.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1				3.00	3.4	267	7.00	5.6	3,800	5.00	5.4	3,490
2				3.00	3.45	282	7.00	4.8	2,610	5.00	5.0	2,890
3				3.00	3.42	273	7.00	4.5	2,230	5.00	4.1	1,770
4				3.00	3.45	282	7.00	3.5	1,130	5.00	3.1	860
5				3.00	3.2	217	7.00	3.3	1,020	5.00	3.7	1,360
6				3.00	2.82	156	7.00	5.4	3,490	5.00	6.4	5,290
7				3.00	2.4	120	7.00	6.1	4,690	6.00	7.6	8,010
8	8.00	2.6	135	3.00	2.52	129	7.00	6.9	6,370	5.00	4.82	2,640
9	8.00	2.7	144	3.00	2.62	137	7.00	5.9	4,310	5.00	4.82	2,640
10	8.00	2.95	173	3.00	3.3	240	7.00	4.2	1,880	5.30	4.05	1,720
11	8.00	2.6	135	3.00	3.12	201	7.00	3.78	1,440	5.30	3.8	1,460
12	8.00	2.8	154	3.00	2.52	129	7.30	3.65	1,320	5.00	3.4	1,100
13	8.00	3.5	298	3.00	3.6	333	7.00	3.7	1,360	5.30	3.8	1,460
14	8.00	4.4	757	3.00	4.2	627	7.00	3.9	1,560	5.00	4.4	2,110
15	8.00	4.1	568	3.00	4.6	903	7.00	4.28	1,970	5.00	4.5	2,230
16	8.00	5.7	3,960	3.00	4.9	2,750	7.00	5.6	3,800	5.00	6.75	6,040
17	8.00	4.28	1,970	3.00	4.1	1,770	7.00	6.3	5,090	5.00	6.0	4,500
18	8.00	4.0	1,660	3.00	4.25	1,940	7.00	5.3	3,340	6.00	5.3	3,340
19	8.00	4.2	1,880	3.00	4.3	1,990	7.00	5.25	3,260	5.00	4.95	2,820
20	8.00	4.6	2,350	3.00	5.0	2,890	7.00	4.4	2,110	6.00	4.3	1,990
21	8.00	4.1	1,770	3.00	3.8	1,460	7.00	4.0	1,660	6.00	3.9	1,560
22	8.00	3.45	1,140	3.00	3.25	980	7.00	4.32	2,010	5.00	4.5	2,230
23	8.00	2.95	742	3.00	2.75	600	7.00	5.3	3,340	6.00	5.1	3,040
24	7.00	2.58	495	3.00	2.8	633	7.00	4.7	2,480	6.00	4.68	2,450
25	8.00	2.62	518	3.00	2.45	424	7.00	3.5	1,180	3.00	3.7	1,360
26	8.00	2.22	317	5.00	2.6	506	7.00	3.8	1,460	5.00	3.6	1,270
27	7.00	2.5	450	5.00	2.4	398	7.00	3.8	1,460	5.00	3.58	1,250
28	7.00	2.35	374	5.00	2.65	536	7.00	3.65	1,320	6.00	3.6	1,270
29	7.00	2.78	620	5.00	4.2	1,880	7.00	3.5	1,180	5.00	3.4	1,100
30	7.00	4.6	2,350	5.00	4.35	2,050	7.00	3.3	1,020	5.00	3.25	980
31	7.00	4.05	1,720	5.30	4.3	1,990						

Gage height, in feet, and discharge, in second-feet, of Deerfield River at Hoosac Tunnel, Mass., for 1911–12—Continued.

Day.	May.						June.					
	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.00	3.15	900	5.00	3.3	1,020	7.00	4.68	2,450	5.00	3.7	1,360
2	7.00	3.1	860	5.00	3.0	780	7.00	3.4	1,100	5.00	3.15	900
3	7.00	2.8	633	5.00	2.72	580	7.00	6.8	6,150	5.00	5.0	2,890
4	7.00	2.6	506	5.00	2.3	351	7.00	4.1	1,770	6.00	3.75	1,410
5	7.00	2.1	269	5.00	2.6	506	7.00	3.82	1,480	6.00	3.6	1,270
6	7.00	3.22	956	5.00	3.8	1,460	7.00	3.3	1,020	5.00	3.9	1,560
7	7.00	3.6	1,270	5.00	3.42	1,120	7.00	3.8	1,460	5.00	3.75	1,410
8	7.00	3.2	940	6.00	3.0	780	7.00	3.4	1,100	5.00	3.3	1,020
9	7.00	3.0	780	6.00	3.3	1,020	7.00	2.5	450	6.00	2.8	633
10	7.00	2.85	668	6.00	3.0	780	7.00	2.6	506	6.00	2.58	495
11	7.00	2.8	633	6.00	2.75	600	7.00	2.7	567	5.00	2.95	424
12	7.00	2.5	450	5.00	2.6	506	7.00	2.32	360	5.00	2.23	321
13	7.00	2.7	567	6.00	3.0	780	7.00	1.95	218	5.00	2.18	300
14	7.00	3.4	1,100	6.00	3.1	860	7.00	2.0	234	5.00	.85	188
15	7.00	2.9	704	5.00	2.88	690	7.00	1.68	142	5.00	1.75	160
16	7.00	2.7	567	6.00	2.7	567	7.00	1.9	202	5.00	1.75	160
17	7.00	5.8	4,130	6.00	5.6	3,800	7.00	1.82	179	5.00	2.25	330
18	7.00	4.35	2,050	6.00	3.85	1,510	7.00	1.8	173	5.00	1.8	173
19	7.00	3.45	1,140	6.00	3.25	980	7.00	1.78	168	5.00	1.8	173
20	7.00	3.1	860	6.00	3.05	820	7.00	1.4	84	5.00	1.62	129
21	7.00	3.3	1,020	7.00	3.25	980	7.00	1.5	103	5.00	1.4	84
22	7.00	3.9	1,560	6.30	3.6	1,270	7.00	1.35	76	5.00	1.5	103
23	7.00	3.5	1,180	7.00	3.2	940	7.00	1.0	28	5.00	1.65	136
24	7.00	3.1	860	6.30	3.3	1,020	7.00	1.28	64	5.00	1.5	103
25	7.00	3.2	940	5.00	3.0	780	7.00	1.3	67	5.00	1.4	84
26	7.00	2.8	633	6.30	2.7	567	7.00	1.3	67	5.00	1.33	72
27	7.00	2.65	536	5.00	2.58	495	7.00	1.28	64	5.00	1.45	94
28	7.00	2.4	398	6.00	2.6	506	7.00	1.32	70	5.00	1.2	52
29	7.00	2.3	351	6.00	2.5	450	7.00	1.15	46	5.00	1.28	64
30	7.00	5.8	4,130	6.00	5.8	4,130	7.00	1.0	28	5.00	1.02	30
31	7.00	5.0	2,890	6.00	4.8	2,610	......	......	......	......	......	......

Day.	July.						August.					
	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.00	1.25	60	5.00	1.48	99	7.00	1.3	67	5.00	1.25	60
2	7.00	1.22	55	5.00	1.38	81	7.00	1.18	49	5.00	.9	19
3	7.00	1.1	39	5.00	1.4	84	7.00	.9	19	5.00	.78	11
4	7.00	1.35	76	5.00	.72	8	7.00	1.0	28	5.00	.8	12
5	7.00	.9	19	5.00	.8	12	7.00	1.7	147	5.00	1.1	39
6	7.00	.8	12	5.00	.7	7	7.00	1.52	107	5.00	1.5	103
7	7.00	.68	6	5.00	1.8	173	7.00	1.3	67	5.00	1.2	52
8	7.00	1.78	168	5.00	1.55	114	7.00	.8	12	5.00	1.0	28
9	7.00	1.45	94	5.00	1.4	84	7.00	.9	19	5.00	1.05	34
10	7.00	1.35	76	5.00	1.3	67	7.00	.8	12	5.00	1.05	34
11	7.00	1.3	67	5.00	1.4	84	7.00	1.15	46	5.30	2.8	633
12	7.00	1.4	84	5.00	1.2	52	7.00	2.3	351	5.00	2.25	330
13	7.00	1.28	64	5.00	1.5	103	7.00	1.9	202	5.00	1.75	160
14	7.00	1.4	84	5.00	1.1	39	7.00	1.68	142	5.00	1.55	114
15	7.00	1.7	147	5.00	1.9	202	7.00	1.28	64	5.00	1.4	84
16	7.00	1.8	173	5.00	1.6	124	7.00	1.35	76	5.00	1.0	28
17	7.00	1.4	84	5.00	1.35	76	7.00	.8	12	5.00	1.0	28
18	7.00	1.2	52	5.00	1.7	147	7.00	1.2	52	5.00	1.0	28
19	7.00	2.45	424	5.00	2.0	234	7.00	2.1	269	5.00	2.0	234
20	7.00	1.9	202	5.00	1.78	168	7.00	2.2	308	5.00	2.1	269
21	7.00	1.6	124	5.00	1.2	52	7.00	1.85	188	5.00	1.78	168
22	7.00	1.7	147	5.00	2.1	269	7.00	1.43	90	5.00	1.5	103
23	7.00	1.6	124	5.00	1.45	94	7.00	1.3	67	5.00	2.1	269
24	7.00	1.48	99	5.00	1.5	103	7.00	2.5	450	5.00	2.35	374
25	7.00	1.35	76	5.00	1.28	64	7.00	2.0	234	5.00	2.05	252
26	7.00	1.38	81	5.00	1.45	94	7.00	2.5	450	5.00	2.48	440
27	7.00	1.3	67	5.00	1.38	81	7.00	2.55	478	5.00	1.9	202
28	7.00	1.1	39	5.00	.9	19	7.00	1.8	173	6.00	1.9	202
29	7.00	.8	12	5.00	.8	12	7.00	1.9	202	6.00	2.0	234
30	7.00	.7	7	5.00	1.0	28	7.00	1.98	228	5.00	1.75	160
31	7.00	1.3	67	5.00	1.4	84	7.00	.9	19	5.00	1.35	76

Gage height, in feet, and discharge, in second-feet, of Deerfield River at Hoosac Tunnel, Mass., for 1911–12—Continued.

Day.	September.						October.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.00	1.28	64	5.00	1.1	39	7.00	2.2	308	5.00	2.1	269
2	7.00	1.38	81	5.00	1.55	114	7.00	2.0	234	5.00	2.2	308
3	7.00	1.48	99	5.00	1.48	99	7.00	2.1	269	5.00	2.0	234
4	7.00	2.48	440	5.00	2.1	269	7.00	1.95	218	5.00	2.0	234
5	7.00	1.98	228	5.00	1.85	188	7.00	1.82	179	5.00	1.8	173
6	7.00	1.85	188	5.00	1.98	228	7.00	1.7	147	5.00	1.78	168
7	7.00	1.9	202	5.00	1.85	188	7.00	1.65	136	5.00	1.45	94
8	7.00	1.5	103	5.00	1.45	94	7.00	1.6	124	5.00	1.48	99
9	7.00	1.6	124	5.00	1.48	99	7.00	1.4	84	5.00	1.65	136
10	7.00	1.55	114	5.00	1.45	94	7.00	1.35	76	5.00	1.5	103
11	7.00	1.3	67	5.00	1.38	81	7.00	1.75	160	5.00	2.5	450
12	7.00	1.0	28	5.00	1.35	76	7.00	2.7	567	5.00	2.65	536
13	7.00	1.2	52	5.00	1.0	28	7.00	2.4	398	5.00	2.5	450
14	7.00	1.18	49	5.00	1.25	60	7.00	2.32	360	5.00	2.2	308
15	7.00	1.0	28	5.00	.8	12	7.00	2.22	317	5.00	2.0	234
16	7.00	1.8	173	5.00	3.45	1,140	7.00	1.85	188	5.00	1.68	142
17	7.00	2.6	506	5.00	2.45	424	7.00	1.75	160	5.00	1.7	147
18	7.00	2.1	269	5.00	1.85	188	7.00	1.8	173	5.00	1.82	179
19	7.00	1.8	173	5.00	1.78	168	7.00	1.85	188	5.00	2.5	450
20	7.00	1.5	103	5.00	1.65	136	7.00	2.1	269	5.00	2.0	234
21	7.00	1.9	202	5.00	2.1	269	7.00	2.15	288	5.00	2.1	269
22	7.00	2.08	252	5.00	2.0	234	7.00	2.1	269	5.00	1.85	188
23	7.00	1.9	202	5.00	1.85	188	7.00	1.5	103	5.00	6.5	5,500
24	7.00	1.82	179	5.00	1.78	168	6.30	10.7	17,250	5.00	7.7	8,250
25	7.00	1.65	136	5.00	1.5	103	7.00	6.1	4,690	5.00	5.5	3,640
26	7.00	1.35	76	5.00	1.48	99	7.00	5.25	3,260	5.00	4.55	2,290
27	7.00	1.3	67	5.00	1.1	39	7.00	5.2	3,190	5.00	4.5	2,230
28	7.00	1.5	103	5.00	1.35	76	7.00	3.4	1,100	5.00	3.2	940
29	7.00	1.1	39	5.00	1.18	49	7.00	3.0	780	5.00	2.9	704
30	7.00	2.1	269	5.00	2.0	234	7.00	2.8	633	5.00	2.0	234
31	......	......	......	......	......	......	7.00	1.5	103	5.00	2.3	351

Day.	November.						December.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.00	2.6	506	5.00	2.9	704	7.00	2.1	269	4.30	2.2	308
2	7.00	3.5	1,180	5.00	3.0	780	7.00	2.3	351	4.30	2.75	600
3	7.00	2.7	567	5.00	2.5	450	7.00	5.82	4,170	4.30	4.5	2,230
4	7.00	2.4	398	5.00	2.35	374	7.00	4.1	1,770	4.30	3.6	1,270
5	7.00	2.4	398	5.00	2.35	374	7.00	3.3	1,020	4.30	3.1	860
6	7.00	2.3	351	5.00	2.4	398	7.00	3.5	1,180	4.30	3.45	1,140
7	7.00	2.5	450	5.00	2.6	506	7.00	3.52	1,200	4.30	3.4	1,100
8	7.00	5.6	3,800	5.00	4.45	2,170	7.30	3.5	1,180	4.30	3.25	980
9	7.00	3.9	1,560	5.00	3.6	1,270	7.30	3.1	860	4.30	2.9	704
10	7.00	3.35	1,060	5.00	3.0	780	7.30	2.8	633	4.30	2.6	506
11	7.00	2.9	704	5.00	2.8	633	7.30	2.55	478	4.30	2.72	580
12	7.00	2.6	506	5.00	2.5	450	7.30	2.45	424	4.30	2.5	450
13	7.00	2.52	461	5.00	3.0	780	7.30	2.35	374	4.30	2.3	351
14	7.00	4.1	1,770	5.00	3.7	1,360	7.30	2.3	351	4.30	2.4	398
15	7.00	3.0	780	5.00	2.7	567	8.00	2.2	308	4.30	2.1	269
16	7.00	2.58	495	5.00	3.0	780	8.00	2.4	389	4.30	2.35	374
17	7.00	2.9	704	5.00	2.8	633	8.00	2.3	351	4.30	2.1	269
18	7.00	2.75	600	5.00	2.68	555	8.00	1.9	202	4.30	1.85	188
19	7.00	2.45	424	5.00	2.5	450	8.00	2.0	234	4.30	3.5	1,180
20	7.00	2.45	424	5.00	2.48	440	8.00	3.1	860	4.30	3.0	780
21	7.00	2.4	398	5.00	2.5	450	8.00	2.85	668	4.30	2.6	506
22	7.00	2.48	440	5.00	2.45	424	8.00	2.4	398	4.30	2.35	374
23	7.00	2.45	424	5.00	2.32	360	8.00	2.45	424	4.30	2.3	351
24	7.00	2.2	308	5.00	2.3	351	8.00	2.3	351	4.30	2.25	330
25	7.00	2.42	408	4.30	2.3	351	8.00	2.2	308	4.30	2.18	300
26	7.00	2.25	330	4.30	2.2	308	8.00	2.2	308	4.30	2.22	317
27	7.00	2.2	308	4.30	2.1	269	8.00	2.1	269	4.30	2.3	351
28	7.00	2.15	288	4.30	2.1	269	8.00	2.15	288	4.30	2.2	308
29	7.00	2.1	269	4.30	2.15	288	8.00	2.3	351	4.30	2.18	300
30	7.00	2.05	252	4.30	2.0	234	8.00	2.35	374	4.30	3.0	780
31	......	......	......	......	......	......	8.00	4.3	1,990	4.30	3.8	1,460

NOTE.—Relation of gage height to discharge affected by ice during January, February, and March, 1911, and Jan. 6 to about Mar. 13, 1912. Daily discharge determined from a fairly well-defined rating curve.

DEERFIELD RIVER AT SHELBURNE FALLS, MASS.

Location.—At the plant of the Greenfield Electric Light & Power Co. at Shelburne Falls.

Records available.—June 1, 1907, to December 31, 1912.

Drainage area.—501 square miles.

Dam and power plant.—The dam is of concrete, of ogee section, and is similar in form to one that has been rated. The height of the dam was increased 3 feet in the fall of 1908. Two units are now installed. Ratings of one of these units have been made by the Survey for use in conjunction with the Holyoke ratings of the wheels.

Computations of discharge.—The flow through the wheels is computed from the gate openings and from power readings made at half-hour intervals. The height of water on the dam, in the fore bay, in the tailrace, and at the wasteways is read three times daily. The total electrical output is measured twice a day.

Accuracy.—Owing to the extreme care with which the readings are made, winter and summer, the records at this station are considered good, particularly so since the dam was raised in 1908.

Cooperation.—Records furnished by H. K. Barrows, Boston, Mass.

Daily discharge, in second-feet, of Deerfield River at Shelburne Falls, Mass., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	656	346	307	6,060	1,640	2,450	120	126	118	388	1,190	659
2	331	218	299	5,750	1,290	1,590	147	142	145	311	2,060	967
3	297	317	305	3,960	1,280	5,820	153	151	291	327	1,660	5,250
4	414	332	299	2,700	978	2,620	110	183	570	274	1,840	2,560
5	200	323	275	3,420	923	1,980	93	188	424	238	1,180	1,780
6	185	336	258	8,120	1,280	1,830	81	142	276	213	1,060	3,680
7	251	306	268	11,140	2,030	2,460	60	118	247	142	1,340	3,220
8	368	348	289	8,120	1,470	1,580	199	122	200	212	4,320	2,100
9	381	272	341	3,960	1,280	1,320	164	110	154	182	2,670	1,580
10	411	296	369	2,940	1,470	717	142	101	188	142	2,000	1,430
11	293	271	285	2,460	1,270	643	110	431	146	270	1,490	1,260
12	299	276	300	2,250	909	342	92	561	122	474	1,500	930
13	252	272	2,950	2,460	987	344	107	313	113	308	1,510	839
14	333	262	1,640	3,630	1,650	338	73	200	116	592	3,820	986
15	260	266	2,440	3,410	1,270	322	124	137	51	396	3,110	421
16	267	264	5,600	7,760	1,840	403	219	148	351	281	2,020	651
17	265	248	3,650	6,050	5,110	385	146	107	650	267	1,820	1,000
18	273	279	3,700	5,430	2,670	343	147	143	374	223	1,680	865
19	297	264	4,540	4,760	1,580	334	438	425	274	225	1,340	1,450
20	669	294	4,840	2,910	1,290	334	364	462	278	212	1,190	1,780
21	649	300	3,160	2,390	1,460	298	230	257	292	295	1,340	1,150
22	633	372	2,260	2,680	2,250	218	238	165	280	290	1,350	1,060
23	476	366	1,280	3,950	1,640	215	252	245	266	4,350	1,180	858
24	455	357	1,240	2,930	1,290	238	191	417	276	13,910	1,140	472
25	424	340	1,130	2,250	1,440	251	165	317	282	6,760	1,510	365
26	420	379	840	1,840	1,075	198	118	340	205	4,540	1,350	525
27	266	371	987	1,630	849	212	125	498	202	2,420	1,190	635
28	251	353	847	1,980	847	181	134	360	149	2,060	1,140	619
29	341	340	3,970	1,650	993	161	86	266	148	1,690	470	657
30	368	....	4,840	1,650	6,670	121	118	260	240	1,510	620	986
31	368	....	3,640	....	4,530	....	100	178	....	1,360	....	3,460

Monthly discharge of Deerfield River at Shelburne Falls, Mass., for 1912.

[Drainage area, 501 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	669	185	366	0.73	0.84
February	379	218	309	.62	.67
March	5,600	258	1,840	3.68	4.24
April	11,140	1,630	4,010	8.00	8.93
May	6,670	847	1,780	3.55	4.09
June	5,820	121	940	1.88	2.10
July	438	60	156	.31	.36
August	561	101	245	.49	.56
September	650	51	248	.50	.55
October	13,910	142	1,450	2.89	3.33
November	4,320	470	1,650	3.30	3.68
December	5,250	365	1,430	2.84	3.27
The year	13,910	51	1,200	2.40	32.62

WARE RIVER AT GIBBS CROSSING, MASS.

Location.—Between the highway bridge and the electric railway bridge, about 3 miles below Ware, at the point known as Gibbs Crossing. Muddy Brook (drainage area, about 30 square miles) enters from the right at Ware; Beaver Brook (drainage area of about 29 square miles) enters from the right about 2½ miles below the station.

Records available.—August 20 to December 31, 1912.

Drainage area.—201 square miles.

Gage.—Automatic gage, protected by a wooden shelter 5 feet square, on the right bank just above the highway bridge, is set over a plank well 30 by 40 inches, the well being connected with the stream by a 4-inch cast-iron pipe. A sloping staff gage is set in the bank almost over the intake pipe to serve as a check on the automatic gage.

Channel.—Rough but practically permanent.

Discharge measurements.—Made from the downstream side of the highway bridge at extreme high stages, from the upstream side of the electric railway bridge at medium stages, and by wading at low stages.

Winter flow. Relation between gage height and discharge somewhat affected by ice during the coldest weather.

Artificial control.—The operation of mills at points upstream causes a large diurnal fluctuation at this station and makes automatic records necessary.

Accuracy.—The rating curve is well defined and estimates based on continuous records of gage height are good.

Discharge measurements of Ware River at Gibbs Crossing, Mass., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 31	G. H. Canfield	1.47	23.0
31	.....do	1.82	58.1
Oct. 30	J. G. Mathers	2.16	133
Nov. 13	C. S. DeGolyer	2.52	242
Dec. 17	.....do	2.49	238

Daily discharge, in second-feet, of Ware River at Gibbs Crossing, Mass., for 1912.

Date.	Aug.	Sept.	Oct.	Nov.	Dec.	Date.	Aug.	Sept.	Oct.	Nov.	Dec.
1		16	69	76	23	16		57	46	133	121
2		12	39	49	97	17		49	44	134	121
3		27	44	22	175	18		39	47	145	99
4		36	46	87	195	19		39	38	145	125
5		37	34	56	169	20	94	40	19	150	154
6		41	16	43	180	21	86	40	46	105	152
7		36	28	54	187	22	78	13	45	80	145
8		26	43	134	194	23	79	79	62	54	160
9		43	45	185	182	24	64	70	109	19	136
10		42	45	133	189	25	26	49	96	106	52
11		61	51	185	155	26	139	45	74	134	172
12		73	26	81	149	27	96	46	20	148	162
13		80	15	102	133	28	56	33	71	58	167
14		45	31	113	76	29	36	13	61	156	176
15		16	46	147	28	30	36	64	69	80	302
						31	38		77		817

Note.—Daily discharge is the average of 24 hourly discharges taken from the automatic record and based on a well-defined rating curve.

Monthly discharge of Ware River at Gibbs Crossing, Mass., for 1912.

[Drainage area, 201 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 20-31	139	26	69	0.343	0.15	A.
September	80	12	42	.209	.23	A.
October	109	15	48	.239	.28	A.
November	185	19	104	.517	.58	A.
December	817	23	168	.836	.96	A.

SWIFT RIVER NEAR WEST WARE, MASS.

Location.—Just below the wooden dam opposite the West Ware station of the Athol branch of the Boston & Albany Railroad, about 6 miles by river downstream from Enfield.

Records available.—July 15, 1910, to December 31, 1912.

Drainage area.—191 square miles.

Gages.—Standard chain gage attached to downstream side of footbridge, about 400 feet below the dam; in use July 15, 1910, to August 25, 1912; staff gage fastened to the headworks of the flume; and an automatic gage (used August 25 to December 31, 1912) on the left bank, about 600 feet below the dam. The automatic gage is protected by a wooden shelter 5 feet square, and set over a timber well 3 feet square. The well is far enough back from the bank to protect it from the frost and is connected with the river by a 4-inch cast-iron pipe.

Discharge measurements.—Made from cable 50 feet above the automatic gage during high and medium stages and by wading at low stages.

Artificial control.—Mills and power plants above the station cause a very marked diurnal fluctuation in the flow at this point. For this reason it is not advisable to attempt to estimate the daily discharge from semidaily gage readings at present. Therefore the gage reader's observations prior to the installation of the automatic gage are being published, together with the flow corresponding to each.

Accuracy.—A fairly good rating curve has been developed for this station and estimates based on continuous records of gage height are good.

Discharge measurements of Swift River near West Ware, Mass., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*			*Feet.*	*Sec.-feet.*
Feb. 10[a]	G. H. Canfield......	3.41	138	Oct. 31[c]	J. G. Mathers......	[d]2.04	125
Apr. 24	C. S. De Golyer.....	4.98	676	31[c]	.....do.............	[d]2.08	121
Aug. 23[b]	G. H. Canfield......	1.53	31.5	Nov. 18[b]	C. S. De Golyer.....	[d]2.50	172
30[b]	.....do.............	1.475	30.9	29[b]	.....do.............	[d]2.24	151
30[b]	.....do.............	2.02	85.2	Dec. 18[b]	.....do.............	2.26	145
30[b]	.....do.............	1.87	70.3	18[b]	.....do.............	2.22	133

[a] River nearly free of ice at bridge, measurement made under four-fifths ice cover, 1,000 feet below gage.
[b] Measurement made by wading.
[c] Measurement made from footbridge 500 feet above gage. Section rough and irregular.
[d] Gage height somewhat uncertain because of defective hook gage.

NOTE.—Beginning Aug. 23 the gage height of all discharge measurements are referred to hook gage in new gage house.

Gage height, in feet, and discharge, in second-feet, of Swift River near West Ware, Mass., for 1910–1912.

[R. L. Shaw, observer.]

Day.	July.						August.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1910.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	......	......	......	......	......	......	7.00	2.32	44	8.15	2.9	105
2	......	......	......	......	......	......	6.45	2.38	48	7.25	2.98	116
3	......	......	......	......	......	......	7.00	2.38	48	6.15	2.8	92
4	......	......	......	......	......	......	6.45	2.38	48	6.15	2.82	95
5	......	......	......	......	......	......	7.00	2.48	57	7.00	3.02	122
6	......	......	......	......	......	......	7.00	2.48	57	7.30	2.72	82
7	......	......	......	......	......	......	11.55	2.9	105	......	......	......
8	......	......	......	......	......	......	6.45	2.92	108	5.45	3.15	142
9	......	......	......	......	......	......	6.45	2.72	82	6.45	3.12	137
10	......	......	......	......	......	......	6.45	2.6	69	6.00	3.08	131
11	......	......	......	......	......	......	6.45	2.68	78	5.45	3.02	122
12	......	......	......	......	......	......	6.30	2.6	69	7.30	3.08	131
13	......	......	......	......	......	......	7.30	2.48	57	7.15	2.95	112
14	......	......	......	......	......	......	11.45	2.48	57	......	......	......
15	......	......	......	6.35	2.82	95	6.45	2.68	78	6.00	3.08	131
16	6.55	2.32	44	5.15	2.72	82	6.55	2.5	59	5.45	3.08	131
17	11.15	2.38	48	......	......	......	6.45	2.4	50	6.25	3.1	134
18	7.00	2.2	35	6.15	2.75	86	6.35	2.4	50	5.30	3.02	122
19	7.00	2.38	48	7.30	2.82	95	7.15	2.52	61	6.45	3.18	147
20	7.00	2.32	44	7.30	2.72	82	6.55	2.48	57	6.00	2.88	102
21	6.45	2.28	41	7.45	2.7	80	11.45	2.42	44	......	......	......
22	7.00	2.28	41	5.40	2.7	80	7.00	2.48	57	6.40	3.05	126
23	6.45	2.3	42	7.00	2.38	48	7.00	2.4	50	7.00	3.02	122
24	......	......	......	1.15	2.3	42	6.35	2.5	59	6.45	2.9	105
25	6.30	2.25	38	6.45	2.9	105	6.45	2.4	50	5.45	2.88	102
26	6.55	2.3	42	6.30	2.78	90	7.00	2.38	48	6.30	2.78	90
27	7.00	2.3	42	6.45	2.65	74	6.45	2.35	46	5.20	2.48	57
28	7.00	2.32	44	6.30	2.62	71	11.55	2.3	42	......	......	......
29	7.00	2.3	42	6.45	2.6	69	6.55	2.3	42	6.15	3.02	122
30	6.55	2.28	41	7.10	2.52	61	6.35	2.3	42	7.00	2.98	116
31	11.45	2.32	44	......	......	......	6.30	2.28	41	7.10	2.9	105

Gage height, in feet, and discharge, in second-feet, of Swift River near West Ware, Mass., for 1910-1912—Continued.

Day.	September.						October.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1910.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	6.35	2.28	41	5.00	2.82	95	7.00	2.3	42	6.00	2.65	74
2	7.00	2.25	38	6.15	2.9	105	......	......	......	12.00	2.4	50
3	6.45	2.2	35	6.15	2.48	57	7.30	2.3	42	6.00	2.4	50
4	......	......	......	12.15	2.35	46	7.00	2.25	38	5.30	2.88	102
5	7.00	2.45	54	5.30	2.65	74	7.30	2.28	41	6.00	2.7	80
6	7.00	2.65	74	6.00	3.28	166	7.30	2.32	44	5.30	2.72	82
7	7.00	2.62	71	6.00	3.12	137	7.30	2.32	44	5.30	2.72	82
8	6.45	2.52	61	6.45	3.15	142	7.15	2.32	44	5.30	2.4	50
9	7.00	2.68	78	6.00	3.25	159	......	......	......	1.30	2.12	30
10	7.00	2.68	78	5.55	3.1	134	7.30	2.58	67	6.00	2.98	116
11	......	......	......	1.30	2.75	86	7.30	2.5	59	5.30	2.92	108
12	7.00	2.8	92	7.00	3.12	137	7.30	2.2	35	6.55	2.65	74
13	6.45	2.5	59	6.10	3.12	137	7.30	2.2	35	5.30	2.9	105
14	6.50	2.48	57	6.00	3.2	150	7.15	2.2	35	5.30	2.88	102
15	7.00	2.45	54	5.30	3.05	126	7.15	2.2	35	5.30	2.55	64
16	7.00	2.4	50	6.10	3.08	131	11.00	2.25	38	......	......	......
17	7.00	2.35	46	6.30	2.4	50	7.30	2.22	36	5.50	2.92	108
18	......	......	......	1.30	2.35	46	7.15	2.22	36	5.45	2.9	105
19	7.00	2.35	46	6.00	3.1	134	7.15	2.2	35	5.45	2.85	98
20	7.00	2.4	50	5.30	2.98	116	7.30	2.22	36	5.30	2.9	105
21	7.00	2.28	41	5.30	2.88	102	7.15	2.22	36	5.30	2.9	105
22	7.00	2.28	41	6.00	2.98	116	7.15	2.2	35	5.30	2.88	102
23	7.00	2.25	38	6.10	2.8	92	......	......	......	1.15	2.2	35
24	7.00	2.25	38	6.00	2.55	64	7.15	2.2	35	5.30	2.9	105
25	......	......	......	12.10	2.25	38	7.15	2.32	44	5.30	2.9	105
26	7.15	2.3	42	6.15	3.05	126	7.00	2.38	48	5.40	2.95	112
27	7.15	2.35	46	6.05	2.15	32	7.15	2.3	42	5.20	2.6	69
28	7.15	1.88	18	6.00	2.4	50	7.15	2.3	42	5.00	2.75	86
29	7.00	2.38	48	6.00	2.8	92	7.15	2.25	38	5.00	2.65	74
30	7.15	2.3	42	6.15	2.7	80	......	......	......	12.30	2.2	35
31	......	......	......	......	......	......	7.30	2.2	35	5.00	2.65	74

Day.	November.						December.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1910.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	2.3	42	5.00	2.65	74	7.30	2.5	59	4.30	3.2	150
2	7.30	2.3	42	5.30	2.7	80	7.30	2.52	61	4.30	3.05	126
3	7.30	2.42	52	5.00	3.02	122	7.30	2.5	59	4.30	2.88	102
4	7.30	2.38	48	5.30	3.2	150	11.30	2.55	64	......	......	......
5	7.30	2.7	80	5.30	3.08	131	7.45	2.6	69	4.30	3.15	142
6	......	......	......	1.30	2.95	112	7.45	2.6	69	4.30	2.98	116
7	7.30	3.02	122	5.00	3.3	168	7.45	2.6	69	4.30	2.98	116
8	7.30	3.02	122	5.00	3.3	168	7.45	2.45	54	4.30	3.02	122
9	7.30	2.9	105	5.00	3.2	150	7.45	2.4	50	4.30	3.02	122
10	7.30	2.95	112	5.00	3.2	150	7.45	2.45	54	4.30	3.02	122
11	7.30	2.9	105	5.00	3.22	154	......	......	......	1.15	2.38	48
12	7.30	2.9	105	5.00	3.2	150	7.45	2.45	54	4.30	2.9	105
13	11.15	2.92	108	......	......	......	7.45	2.45	54	4.30	3.02	122
14	7.30	2.8	92	5.00	2.95	112	7.45	2.35	46	4.30	2.8	92
15	7.30	2.52	61	5.00	2.9	105	7.45	2.32	44	4.30	2.82	95
16	7.30	2.5	59	5.00	3.2	150	7.45	2.5	59	5.00	2.8	92
17	7.30	2.5	59	5.00	2.98	116	7.45	2.48	57	5.00	2.65	74
18	7.30	2.4	50	5.00	3.05	126	......	......	......	1.30	2.32	44
19	7.30	2.42	52	5.00	2.8	92	7.45	2.4	50	5.00	3.05	126
20	......	......	......	1.30	2.8	92	7.45	2.35	46	4.30	2.85	98
21	7.30	2.58	67	5.00	3.18	131	7.45	2.35	46	4.30	2.92	108
22	7.30	2.5	59	4.45	2.98	116	7.45	2.5	59	5.00	2.88	102
23	7.30	2.75	86	4.00	2.92	108	7.45	2.5	59	5.00	2.88	102
21	7.30	2.42	52	4.30	2.42	52	7.45	2.62	71	5.00	3.9	303
25	7.30	2.58	67	4.30	2.6	69	11.30	3.2	150	......	......	......
26	7.30	2.5	59	4.30	2.58	67	7.45	3.22	154	4.45	3.32	172
27	11.30	2.42	52	......	......	......	7.45	3.5	208	4.30	3.52	212
28	7.30	2.5	59	4.00	3.12	137	7.45	3.5	208	4.30	3.45	198
29	7.30	2.5	59	4.30	3.1	134	7.45	3.4	187	4.30	3.4	187
30	7.30	2.5	59	4.30	3.2	150	7.45	3.45	198	4.30	3.4	187
31	......	......	......	......	......	......	7.30	3.32	112	4.30	3.4	187

Gage height, in feet, and discharge, in second-feet, of Swift River near West Ware, Mass., for 1910–1912—Continued.

Day.	January.						February.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	11.15	3.35	178				7.45	3.6	230	5.00	3.5	208
2	7.45	3.35	178	4.30	3.5	208	7.45	3.6	230	5.00	3.15	142
3	7.45	3.6	230	4.30	3.8	277	7.45	3.22	154	5.00	3.2	150
4	7.45	4.05	344	4.30	4.15	373	7.45	3.02	122	5.00	3.3	168
5	7.45	4.32	427	4.30	4.15	373				1.30	3.3	168
6	7.45	4.3	420	4.30	4.02	336	7.45	3.12	137	5.00	3.22	154
7	7.35	3.8	277	4.30	3.72	258	7.45	3.12	137	5.00	3.22	154
8	11.30	3.5	208				7.45	3.1	134	5.00	3.25	159
9	7.45	3.5	208	4.30	3.45	198	7.45	3.05	126	5.00	3.38	183
10	7.45	3.32	172	4.30	3.5	208	7.45	2.98	116	5.00	3.3	168
11	7.45	3.32	172	4.30	3.45	198	7.45	3.05	126	5.00	3.3	168
12	7.45	3.35	178	4.30	3.35	178				1.30	2.98	116
13	7.45	3.32	172	4.30	3.35	178	7.45	2.98	116	5.00	3.3	168
14	7.45	3.3	168	4.30	3.1	134	7.45	2.8	92	5.00	3.3	168
15	11.00	3.22	154				7.45	2.82	95	5.00	3.25	159
16	7.45	2.82	95	4.30	3.25	159	7.45	2.82	95	5.00	3.3	168
17	7.45	3.25	159	5.00	3.3	168	7.45	2.85	98	5.00	3.3	168
18	7.45	3.1	134	5.00	3.32	172	7.45	2.72	82	5.00	3.12	137
19	7.45	2.9	105	5.00	3.25	159				1.30	2.9	105
20	7.45	2.7	80	5.00	3.02	122	7.45	2.82	95	5.00	3.3	168
21	7.45	2.85	98	5.00	2.82	95	7.45	2.8	92	5.00	3.15	142
22	11.00	2.9	105				7.45	3.25	159	5.00	3.05	126
23	7.45	2.85	98	5.00	3.15	142	7.45	2.75	86	5.00	3.1	134
24	7.45	2.52	61	5.00	3.02	122	7.45	2.7	80	5.00	2.7	80
25	7.45	2.5	59	5.00	3.15	142	7.45	2.88	102	5.00	2.88	102
26	7.45	2.5	59	5.00	3.02	122	11.45	2.9	105			
27	7.45	2.42	52	5.00	3.1	134	7.30	3.02	122	4.30	3.98	325
28	7.45	3.4	187	5.00	3.55	219	7.30	3.5	208	4.30	3.45	198
29	11.30	3.6	230									
30	7.45	3.65	242	5.00	3.6	230						
31	7.45	3.45	198	5.00	3.6	230						

Day.	March.						April.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	3.4	187	4.30	3.4	187	7.30	5.75	1,040	6.00	5.42	877
2	7.30	3.42	191	4.30	3.42	191	11.45	4.98	682			
3	7.30	3.3	168	4.30	3.3	168	7.30	4.55	509	5.00	4.38	445
4	7.30	3.2	150	4.30	3.3	168	7.30	4.3	420	5.00	4.1	358
5	11.45	3.12	137				7.30	4.05	344	5.00	4.02	336
6	7.30	2.9	105	4.30	2.98	116	7.30	4.1	358	5.00	4.6	528
7	7.30	2.7	80	5.00	3.3	168	7.30	4.85	628	5.00	5.2	777
8	7.30	2.7	80	5.00	3.2	150	7.30	5.5	915	5.00	5.4	868
9	7.30	2.7	80	5.00	3.22	154				1.15	5.22	786
10	7.30	2.75	86	5.00	2.98	116	7.30	4.88	640	5.00	4.8	607
11	7.30	2.95	112	5.00	3.28	164	7.30	4.8	607	5.00	4.7	567
12				1.30	3.1	134	7.30	4.6	528	5.00	4.52	497
13	7.30	2.92	108	5.00	3.42	191	7.30	4.5	490	5.00	4.4	454
14	7.30	3.02	122	5.00	3.4	187	7.00	4.3	420	6.00	4.3	420
15	7.30	4.3	420	5.00	4.85	628	7.30	4.5	490	6.00	4.6	528
16	7.30	4.98	682	6.00	5.1	733				1.15	4.65	547
17	7.30	4.6	528	5.00	4.75	587	7.30	4.55	509	5.00	4.55	509
18	7.30	4.5	490	6.00	4.2	388	7.30	4.55	509	6.00	4.4	454
19	11.45	4.7	567				7.30	4.22	394	6.00	4.15	373
20	7.00	3.72	258	5.00	4.2	388	7.30	4.2	388	5.30	4.15	373
21	7.30	3.8	277	5.00	3.98	325	7.30	4.05	344	6.00	4.02	336
22	7.30	3.9	303	5.00	3.95	317	7.30	4.1	358	6.00	4.05	344
23	7.30	4.1	358	5.00	4.12	364				1.30	3.98	325
24	7.30	4.05	344	6.00	4.1	358	7.00	3.9	303	5.00	3.95	316
25	7.30	3.98	325	5.00	4.02	336	7.30	3.95	316	5.00	3.95	316
26	11.15	3.9	303				7.30	3.82	282	6.00	3.85	290
27	7.30	3.85	290	5.00	4.3	420	7.30	3.9	303	6.00	3.8	277
28	7.30	5.55	938	5.00	6.35	1,350	7.30	3.8	277	6.00	3.82	282
29	7.30	6.35	1,350	5.00	6.15	1,240	7.30	3.8	277	6.00	3.75	265
30	7.30	6.2	1,260	5.00	6.22	1,270	11.30	3.8	277			
31	7.30	6.4	1,380	5.00	6.25	1,290						

Gage height, in feet, and discharge, in second-feet, of Swift River near West Ware, Mass., for 1910–1912—Continued.

Day.	May.						June.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	3.7	253	6.00	3.75	265	7.00	3.4	187	6.00	3.5	208
2	7.30	3.8	277	6.00	3.82	282	7.00	3.05	126	6.00	3.1	134
3	7.30	3.85	290	5.00	3.85	290	7.00	3.05	126	6.00	3.02	122
4	7.30	3.8	277	6.00	3.75	265	11.00	3.2	150	......	......	......
5	7.30	3.75	265	6.00	3.75	265	7.00	3.1	134	6.00	3.35	177
6	7.30	3.6	230	6.00	3.6	230	7.00	3.2	150	6.00	3.4	187
7	11.00	3.62	235	......	......	......	7.00	2.95	112	6.00	3.4	187
8	7.30	3.5	208	6.00	3.5	208	7.00	2.9	105	6.00	2.9	105
9	7.00	3.55	219	6.00	3.6	230	7.00	2.8	92	6.00	2.9	105
10	7.30	3.55	219	6.00	3.52	212	7.30	3.05	126	6.00	2.95	112
11	7.30	3.42	191	6.00	3.45	198	11.00	3.2	150	......	......	......
12	7.30	3.5	208	6.00	3.5	208	7.00	3.2	150	6.00	3.3	168
13	7.00	3.4	187	6.00	3.4	187	7.30	2.8	92	6.00	3.45	198
14	11.00	3.42	191	......	......	......	7.00	2.92	108	6.00	3.42	191
15	7.30	3.28	164	6.00	3.3	168	7.00	2.9	105	6.00	3.42	191
16	7.00	3.3	168	6.00	3.3	168	7.00	2.95	112	6.00	3.3	168
17	7.00	3.2	150	6.00	3.3	168	7.00	2.98	116	6.00	3.2	150
18	7.00	3.2	150	6.00	3.2	150	11.45	3.02	122	......	......	......
19	7.00	3.2	150	6.00	3.32	172	7.00	2.92	108	6.00	3.22	154
20	7.00	3.45	198	6.00	3.65	242	7.00	2.72	82	6.00	3.3	168
21	11.00	3.75	265	......	......	......	7.00	2.72	82	6.00	3.1	134
22	7.00	3.7	253	6.00	3.7	253	7.00	2.65	74	6.00	3.18	147
23	7.30	3.7	253	6.00	3.6	230	7.00	2.65	74	6.00	3.15	142
24	7.30	3.55	219	6.00	3.58	226	7.00	2.65	74	6.00	2.9	105
25	7.00	3.5	208	6.00	3.52	212	11.00	2.65	74	......	......	......
26	7.00	3.5	208	6.00	3.45	198	7.00	2.6	69	6.00	3.1	134
27	7.00	3.45	198	6.00	3.4	187	7.00	2.6	69	6.00	3.1	134
28	......	......	......	1.30	3.38	183	7.00	2.6	69	6.00	3.02	122
29	7.00	3.25	159	6.00	3.4	187	7.00	2.55	64	6.00	3.05	126
30	7.00	3.1	134	6.00	3.15	142	7.00	2.55	64	6.00	3.05	126
31	7.00	3.15	142	6.00	3.4	187	......	......	......	......	......	......

Day.	July.						August.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.00	2.52	61	6.00	3.02	122	6.30	2.65	74	6.30	2.7	80
2	11.00	2.52	61	......	......	......	7.30	2.6	69	6.30	2.7	80
3	7.00	2.5	59	6.00	3.02	122	7.30	2.52	61	5.30	3.1	134
4	7.00	2.5	59	6.00	2.58	67	7.30	2.45	54	6.00	2.7	80
5	7.00	2.55	64	6.00	3.02	122	7.30	2.4	50	6.00	2.7	80
6	7.00	2.5	59	6.00	3.02	122	11.00	2.4	50	......	......	......
7	7.00	2.5	59	6.00	3.05	126	7.30	2.75	86	6.30	3.1	134
8	7.00	2.52	61	6.00	3.02	122	7.30	2.45	54	6.30	2.9	105
9	11.00	2.5	59	......	......	......	7.30	2.45	54	6.00	2.98	116
10	6.00	2.4	50	6.00	2.6	69	7.30	2.4	50	6.30	2.9	105
11	6.00	2.45	54	6.00	2.7	80	7.30	2.4	50	6.30	2.8	92
12	6.00	2.45	54	6.00	2.7	80	7.30	2.45	54	6.30	2.8	92
13	6.00	2.4	50	6.00	2.7	80	11.00	2.45	54	......	......	......
14	6.45	2.4	50	6.00	2.65	74	7.30	2.45	54	6.30	3.05	126
15	7.00	2.4	50	6.00	2.6	69	7.30	2.42	52	6.30	3.1	134
16	......	......	......	1.30	2.38	48	7.30	2.8	92	6.00	3.2	150
17	6.30	2.35	46	6.30	2.6	69	7.00	2.6	69	6.30	3.18	147
18	7.00	2.4	50	6.30	2.8	92	7.30	2.62	71	6.30	3.05	126
19	7.00	2.4	50	6.30	2.8	92	7.30	2.85	98	6.00	2.7	80
20	7.30	2.35	46	6.30	2.82	95	......	......	......	1.30	2.75	86
21	7.30	2.4	50	6.30	2.8	92	7.30	2.75	86	6.30	3.1	134
22	7.00	2.38	48	6.30	2.8	92	7.30	2.6	69	6.00	3.2	150
23	11.30	2.4	50	......	......	......	7.00	2.5	59	6.30	3.1	134
24	7.00	2.38	48	6.30	3.02	122	7.30	2.5	59	6.30	3.15	142
25	7.00	2.6	69	6.30	3.15	142	7.30	2.5	59	6.30	3.15	142
26	7.00	2.55	64	6.30	3.15	142	7.30	2.5	59	3.00	2.6	69
27	7.00	2.55	64	6.30	3.15	142	11.45	2.62	71	......	......	......
28	7.00	2.55	64	6.30	2.9	105	7.30	2.75	86	6.30	2.8	92
29	7.30	2.98	116	5.30	2.95	112	7.30	2.9	105	6.00	3.45	198
30	11.00	2.95	112	......	......	......	7.30	3.1	134	6.30	3.55	218
31	7.30	2.98	116	6.30	2.8	92	7.30	3.55	218	6.30	3.75	265

Gage height, in feet, and discharge, in second-feet, of Swift River near West Ware, Mass., for 1910–1912—Continued.

Day.	September.						October.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	3.8	277	6.00	3.8	277	......	......	......	1.30	2.98	116
2	7.30	3.7	253	6.00	3.68	248	7.30	3.1	134	6.00	3.3	168
3	11.45	3.6	230	......	......	......	7.30	3.15	142	5.30	3.5	208
4	7.30	3.45	198	6.00	3.22	154	7.30	3.15	142	5.30	3.65	244
5	7.30	3.22	154	6.00	3.15	142	7.30	3.4	187	5.30	3.6	230
6	7.30	3.2	150	6.30	3.32	172	7.30	3.45	198	5.00	3.45	198
7	7.00	2.98	116	6.30	3.05	126	7.30	3.5	208	5.00	3.55	219
8	7.30	2.9	105	6.00	3.35	178	10.30	3.55	219	......	......	......
9	7.30	2.82	95	6.00	3.35	178	7.30	3.55	219	5.00	3.65	244
10	11.00	3.12	137	......	......	......	7.30	3.55	219	5.00	3.5	208
11	7.30	3.02	122	6.00	3.4	187	7.30	3.32	172	5.00	3.5	208
12	7.00	2.8	92	6.00	3.4	187	7.30	3.3	168	5.00	3.4	187
13	7.00	2.8	92	6.30	3.05	126	7.30	3.12	137	5.00	3.15	142
14	7.30	2.75	86	6.00	3.3	168	7.30	3.12	137	5.00	3.15	142
15	7.30	2.8	92	6.00	3.02	122	11.00	3.1	134	......	......	......
16	7.30	2.95	112	6.00	2.82	95	7.30	3.05	126	6.00	3.35	178
17	11.00	2.98	116	......	......	......	7.30	2.85	98	5.30	3.4	187
18	7.30	2.8	92	6.00	2.98	116	7.30	2.8	92	5.00	3.6	230
19	7.30	2.75	86	6.00	3.12	137	7.30	5.02	699	5.00	5.3	822
20	7.30	2.8	92	6.00	3.3	168	7.30	6.2	1,260	5.00	6.2	1,260
21	7.30	2.8	92	6.00	3.15	142	7.30	5.9	1,110	5.00	5.7	1,010
22	7.30	2.7	80	6.00	3.02	122	11.00	5.98	1,150	......	......	......
23	7.30	2.72	82	6.00	3.1	134	7.30	6.15	1,240	5.00	6.3	1,320
24	11.30	2.8	92	......	......	......	7.30	6.15	1,240	5.00	6.1	1,210
25	7.00	2.78	90	6.00	3.15	142	7.30	5.7	1,010	5.00	5.7	1,010
26	7.30	2.65	74	6.00	3.15	142	7.30	5.22	786	5.00	5.1	733
27	7.30	2.6	69	6.00	3.2	150	7.30	4.95	669	5.00	4.8	607
28	7.30	2.75	86	6.00	3.1	134	7.30	4.65	548	5.00	4.65	548
29	7.30	2.6	69	6.00	3.2	150	11.00	4.4	454	......	......	......
30	7.30	2.62	71	6.00	3.2	150	7.30	4.2	388	5.00	4.15	373
31	......	......	......	......	......	......	7.30	4.1	358	5.00	4.1	358

Day.	November.						December.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	4.05	344	5.00	4.1	358	7.30	4.4	454	5.00	4.4	454
2	7.30	4.05	344	5.00	4.1	358	7.30	4.4	454	5.00	4.4	454
3	7.30	3.98	325	5.00	4.05	344	11.00	4.2	388	......	......	......
4	7.30	4.02	336	5.00	4.05	344	7.30	4.1	358	5.00	4.1	358
5	11.00	3.85	290	......	......	......	7.30	4.1	358	5.00	4.1	358
6	7.30	3.75	265	5.00	3.9	303	7.30	4.1	358	5.00	4.05	344
7	7.30	3.98	325	5.00	4.05	344	7.30	3.95	316	5.00	3.95	316
8	7.30	4.2	388	5.00	4.2	388	7.30	3.85	290	5.00	3.85	290
9	7.30	4.1	358	5.00	4.2	388	7.30	3.85	290	5.00	3.85	290
10	7.30	4.1	358	5.00	4.1	358	11.00	3.85	290	......	......	......
11	7.30	4.05	344	5.00	4.1	358	7.30	3.75	265	4.00	3.8	277
12	......	......	......	1.30	4.05	344	7.30	3.9	303	4.00	3.95	316
13	7.30	4.1	358	5.00	4.1	358	7.30	3.9	303	4.00	3.9	303
14	7.30	4.12	364	5.00	4.1	358	7.30	3.9	303	4.00	3.9	303
15	7.30	4.3	420	5.00	4.35	437	7.30	3.9	303	4.00	4.02	336
16	7.30	4.4	454	5.00	4.42	461	7.30	4.05	344	4.00	4.1	358
17	7.30	4.45	472	5.00	4.45	472	11.30	4.4	454	......	......	......
18	7.30	4.52	498	5.00	4.6	528	7.30	4.6	528	4.00	4.65	548
19	11.00	4.9	648	......	......	......	7.30	4.7	567	4.00	4.6	528
20	7.30	5.05	712	5.00	5.05	712	7.30	4.4	454	4.00	4.4	454
21	7.30	5.05	712	5.00	5.05	712	7.30	4.3	420	4.00	4.2	420
22	7.30	4.9	648	5.00	4.98	682	7.30	4.15	373	4.00	4.15	373
23	7.30	4.7	567	5.00	4.65	548	7.30	4.65	548	4.00	4.7	567
24	7.30	4.55	509	5.00	4.7	567	10.30	5.05	712	......	......	......
25	7.30	4.85	628	5.00	4.85	628	7.30	5.1	733	4.00	5.1	733
26	11.00	4.8	607	......	......	......	7.30	5.05	712	4.00	5.1	733
27	7.30	4.8	607	5.00	4.8	607	7.30	4.9	648	4.00	5.0	690
28	7.30	4.75	587	5.00	4.75	587	7.30	4.82	615	4.00	4.85	628
29	7.30	4.7	567	5.00	4.7	567	7.30	4.6	528	4.00	4.6	528
30	7.30	4.5	490	5.00	4.5	490	7.30	4.65	548	4.00	4.65	548
31	......	......	......	......	......	......	11.30	4.3	420	......	......	......

Gage height, in feet, and discharge, in second-feet, of Swift River near West Ware, Mass., for 1910–1912—Continued.

Day.	January.						February.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	4.2	......	4.00	4.15	......	7.30	3.52	......	4.00	3.52	......
2	7.30	4.02	......	4.00	4.22	......	7.30	3.52	......	5.00	3.52	......
3	7.30	4.1	......	4.00	4.1	......	7.30	3.5	......	5.00	3.4	......
4	7.30	4.05	......	4.00	4.05	......	11.00	3.42	......	......	......	......
5	7.30	3.9	......	4.00	3.98	......	7.30	3.42	......	5.00	3.42	......
6	7.30	4.05	......	4.00	3.85	......	7.30	3.4	......	5.00	3.4	......
7	11.00	4.02	......	......	......	......	7.30	3.52	......	5.00	3.42	......
8	7.30	3.8	......	4.00	3.8	......	7.30	3.32	......	5.00	3.32	......
9	7.30	3.8	......	4.00	3.8	......	7.30	3.35	......	5.00	3.5	......
10	7.30	3.85	......	4.00	3.85	......	7.30	3.35	......	1.30	3.4	......
11	7.30	3.8	......	4.00	3.8	......	11.30	3.35	......	......	......	......
12	7.30	3.75	......	4.00	3.8	......	7.30	3.42	......	5.00	3.5	......
13	7.30	3.8	......	4.00	3.8	......	7.30	3.7	......	5.00	3.7	......
14	11.30	3.75	......	......	......	......	7.30	3.6	......	5.00	3.6	......
15	7.30	3.65	......	4.00	3.7	......	7.30	3.4	......	5.00	3.58	......
16	7.30	3.7	......	4.00	3.7	......	7.30	3.25	......	5.00	3.45	......
17	7.30	3.8	......	4.00	3.8	......	7.30	3.25	......	5.00	3.45	......
18	7.30	3.7	......	4.00	3.7	......	11.00	3.15	......	......	......	......
19	7.30	3.7	......	4.00	4.05	......	7.30	3.25	......	5.00	3.4	......
20	7.30	3.9	......	4.00	3.9	......	7.30	3.25	......	5.00	3.4	......
21	11.00	3.95	......	......	......	......	7.30	3.5	......	5.00	3.9	......
22	7.30	3.98	......	4.00	3.98	......	7.30	4.5	......	5.00	4.3	......
3	7.30	4.02	......	4.00	4.02	......	7.30	4.4	......	5.00	4.1	......
24	7.30	3.92	......	4.00	3.95	......	7.30	4.1	......	5.00	4.3	......
25	7.30	3.9	......	4.00	3.8	......	11.00	4.12	......	......	......	......
26	7.30	3.85	......	4.00	3.85	......	7.30	4.2	......	5.00	4.2	......
27	7.30	3.6	......	4.00	3.6	......	7.30	4.4	......	5.00	4.3	......
28	11.00	3.6	......	......	......	......	7.30	4.2	......	5.00	4.15	......
29	7.30	3.52	......	4.00	3.52	......	7.30	4.05	......	5.00	4.05	......
30	7.30	3.55	......	4.00	3.55	......	......	......	......	......	......	......
31	7.30	3.52	......	4.00	3.52	......	......	......	......	......	......	......

Day.	March.						April.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	3.88	......	5.00	3.95	......	7.30	6.92	1,690	5.00	6.72	1,570
2	7.30	3.8	......	5.00	3.8	......	7.30	6.48	1,430	5.00	6.62	1,510
3	11.00	3.6	......	......	......	......	7.30	6.92	1,690	5.00	7.12	1,810
4	7.30	3.6	......	5.00	3.6	......	7.30	7.28	1,930	5.00	7.12	1,810
5	7.30	3.52	......	5.00	3.55	......	7.30	6.8	1,620	5.00	6.62	1,510
6	7.30	3.4	......	5.00	3.65	......	7.30	6.42	1,390	5.00	6.42	1,390
7	7.30	3.4	......	5.00	3.6	......	......	......	......	1.30	5.92	1,120
8	7.30	3.4	......	5.00	3.6	......	7.30	6.02	1,170	5.00	6.32	1,330
9	7.30	3.6	......	5.00	3.7	......	7.30	6.32	1,330	5.00	6.28	1,310
10	11.30	3.65	......	......	......	......	7.30	6.12	1,220	5.00	5.92	1,120
11	7.30	3.65	......	5.00	3.8	......	7.30	5.72	1,020	5.00	5.7	1,010
12	7.30	3.75	......	5.00	3.75	......	7.30	5.52	924	5.00	5.32	831
13	7.30	5.8	......	5.00	5.75	......	7.30	5.22	986	5.00	5.12	742
14	7.30	5.6	......	5.00	6.02	......	11.00	5.02	699	......	......	......
15	7.30	5.9	......	5.00	6.28	......	7.30	4.92	656	5.00	4.92	656
16	7.30	8.02	......	5.00	9.28	......	7.30	5.02	699	5.00	5.02	699
17	11.00	9.58	......	......	......	......	7.30	5.22	786	5.00	5.22	786
18	7.30	8.6	......	5.00	7.92	2,390	7.30	5.28	813	5.00	5.32	831
19	7.30	7.22	1,880	5.00	6.92	1,690	7.30	5.52	924	5.00	5.62	972
20	7.30	6.62	1,510	5.00	6.42	1,390	7.30	5.42	877	5.00	5.42	877
21	7.30	6.22	1,270	5.00	6.02	1,170	11.00	5.22	786	......	......	......
22	7.30	5.62	972	5.00	5.58	953	7.30	5.08	724	5.00	5.02	699
23	7.30	5.28	813	5.00	5.12	742	7.30	5.08	724	5.00	5.02	699
24	11.00	4.92	656	......	......	......	7.30	5.02	699	5.00	4.92	656
25	7.30	4.8	607	5.00	4.62	536	7.30	4.8	607	5.00	4.8	607
26	7.30	4.52	498	5.00	4.62	536	7.30	4.72	575	5.00	4.72	575
27	7.30	4.52	498	5.00	4.62	536	7.30	4.52	498	5.00	4.52	498
28	7.30	4.52	498	5.00	4.72	575	11.00	4.38	447	......	......	......
29	7.30	4.85	628	5.00	6.08	1,200	7.30	4.32	427	5.00	4.32	427
30	7.30	6.42	1,390	5.00	7.02	1,750	7.30	4.42	461	5.00	4.42	461
31	11.00	7.38	2,000	......	......	......	......	......	......	......	......	......

Gage height, in feet, and discharge, in second-feet, of Swift River near West Ware, **Mass.,** *for 1910–1912*—Continued.

Day.	May.						June.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	7.30	4.52	498	5.00	4.45	472	6.00	4.48	483	6.00	4.52	498
2	7.30	4.42	461	6.00	4.42	461	11.00	4.52	498	......	......	......
3	7.30	4.42	461	6.00	4.42	461	6.00	4.42	461	6.00	4.32	427
4	7.30	4.28	414	6.00	4.22	394	6.00	4.18	382	6.00	4.12	364
5	11.00	4.02	336	......	......	......	6.00	4.08	352	6.00	3.98	325
6	7.00	4.02	336	6.00	4.02	336	6.00	3.88	298	6.00	3.92	308
7	7.00	4.22	394	6.00	4.22	394	6.00	3.88	298	6.00	3.88	298
8	7.00	4.32	427	6.00	4.38	447	6.00	3.72	258	6.00	3.68	248
9	7.00	4.42	461	6.00	4.72	575	11.00	3.58	226	......	......	......
10	7.00	4.8	607	6.00	4.72	575	6.00	3.52	212	6.00	3.52	212
11	7.00	4.72	575	6.00	4.72	575	6.00	3.52	212	6.00	3.42	191
12	11.00	4.68	559	......	......	......	6.00	3.42	191	6.00	3.42	191
13	7.00	4.68	559	6.00	4.62	536	6.00	3.32	172	6.00	3.32	172
14	7.00	4.62	536	6.00	4.62	536	6.00	3.3	168	6.00	3.3	168
15	7.00	4.62	536	6.00	4.62	536	6.00	3.28	164	6.00	3.28	164
16	7.00	4.72	575	6.00	4.8	607	11.00	3.22	154	......	......	......
17	7.00	5.12	742	6.00	5.22	786	6.00	3.18	147	6.00	3.22	154
18	7.00	5.82	1,070	6.00	5.62	972	6.00	2.88	102	6.00	3.28	164
19	11.00	5.42	877	......	......	......	6.00	2.88	102	6.00	3.22	154
20	7.00	5.22	786	6.00	5.02	699	6.00	2.92	108	6.00	2.68	78
21	6.00	4.88	640	6.00	4.88	640	6.00	2.35	46	6.00	2.15	32
22	6.00	4.92	656	6.00	4.78	599	6.00	2.98	116	6.00	2.95	112
23	6.00	4.78	599	6.00	4.72	575	11.00	2.98	116	......	......	......
24	6.00	4.65	548	6.00	4.88	640	6.00	2.92	108	6.00	2.88	102
25	6.00	5.02	699	6.00	4.72	575	6.00	2.78	90	6.00	2.72	82
26	11.00	4.48	483	......	......	......	6.00	2.68	78	6.00	2.68	78
27	6.00	4.32	427	6.00	4.32	427	6.00	2.65	75	6.00	3.12	137
28	6.00	4.22	394	6.00	4.12	364	6.00	2.62	71	6.00	3.08	131
29	6.00	4.08	352	6.00	4.05	344	6.00	2.5	59	6.00	2.78	90
30	6.00	4.02	336	6.00	4.12	364	11.00	2.52	61	......	......	......
31	6.00	4.35	437	6.00	4.42	461	......	......	......	......	......	......

Day.	July.						August.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	6.00	2.62	71	6.00	3.05	126	6.00	2.22	36	6.00	2.8	92
2	6.00	2.48	57	6.00	3.02	122	6.00	2.22	36	6.00	2.98	116
3	6.00	2.48	57	6.00	2.98	116	6.00	2.28	41	6.00	2.38	48
4	6.00	2.42	52	6.00	2.92	108	11.00	2.22	36	......	......	......
5	6.00	2.38	48	6.00	2.85	98	6.00	2.42	52	6.00	2.42	52
6	6.00	2.52	61	6.00	2.72	82	6.00	2.28	41	6.00	2.92	108
7	11.00	2.48	57	......	......	......	6.00	2.28	41	6.00	2.88	102
8	6.00	2.42	52	6.00	2.92	108	6.00	2.25	38	6.00	2.8	92
9	6.00	2.42	52	6.00	2.85	98	6.00	2.22	36	6.00	2.92	108
10	6.00	2.38	48	6.00	2.8	92	6.00	2.22	36	6.00	2.92	108
11	6.00	2.35	46	6.00	2.72	82	11.00	2.28	41	......	......	......
12	6.00	2.38	48	6.00	2.78	90	7.00	2.32	44	6.00	3.02	122
13	6.00	2.28	41	6.00	2.72	82	7.00	2.32	44	6.00	2.92	108
14	11.00	2.32	44	......	......	......	7.00	2.22	36	6.00	2.8	92
15	6.00	2.38	48	6.00	3.12	137	7.00	2.22	36	6.00	2.62	71
16	6.00	2.52	61	6.00	2.85	98	7.00	2.18	34	6.00	2.62	71
17	6.00	2.35	46	6.00	2.92	108	7.00	2.08	28	6.00	2.62	71
18	6.00	2.28	41	6.00	3.02	122	......	......	......	1.30	2.28	41
19	6.00	2.32	44	6.00	2.72	82	7.00	2.22	36	6.00	3.12	137
20	6.00	2.28	41	6.00	2.62	71	7.00	2.38	48	6.00	3.02	122
21	11.00	2.62	71	......	......	......	7.00	2.28	41	6.00	2.68	102
22	6.00	2.65	74	6.00	3.02	122	6.00	2.22	36	6.00	3.02	122
23	6.00	2.55	64	6.00	2.85	98	6.00	2.15	32	6.00	2.92	108
24	6.00	2.48	57	6.00	2.8	92	6.00	2.18	34	6.00	2.7	80
25	6.00	2.55	64	6.00	3.12	137	11.00	2.28	41	......	......	......
26	6.00	2.42	52	6.00	3.12	137	6.00	2.2	35	6.00	2.9	105
27	6.00	2.35	46	6.00	2.92	108	7.00	2.22	36	6.00	2.98	116
28	11.00	2.62	71	......	......	......	7.00	2.05	26	6.00	2.65	74
29	6.00	2.42	52	6.00	2.98	116	7.00	2.05	26	6.00	2.65	74
30	6.00	2.38	48	6.00	3.18	147	7.00	2.05	26	6.00	2.65	74
31	6.00	2.25	38	6.00	3.02	122	7.00	2.05	26	6.00	2.65	74

NOTE.—Gage heights refer to the chain gage. Discharge determined from a fairly well defined rating curve.

Daily discharge, in second-feet, of Swift River at West Ware, Mass., for 1912.

	Aug.	Sept.	Oct.	Nov.	Dec.		Aug.	Sept.	Oct.	Nov.	Dec.
1			64	58	79	16		55	60	[a] 140	105
2			61	59	104	17		61	52	[a] 145	87
3			56	38	110	18		66	51	140	88
4		67	54	80	117	19		62	44	121	108
5			48	64	120	20		62	24	112	139
6			24	66	142	21		51	58	106	146
7			58	64	162	22		32	55	97	126
8			54	101	163	23		68	48	84	133
9			36	184	159	24		62	64	82	119
10			48	[a] 188	135	25	37	57	69	105	124
11			47	[a] 153	132	26	73	55	63	104	115
12			46	149	122	27	68	54	41	112	116
13			24	131	105	28	57	35	84	83	143
14			45	[a] 130	93	29	53	[a] 55	71	95	147
15		26	77	[a] 135	79	30	52	[a] 67	53	92	224
						31	44		59		378

[a] Estimated.

NOTE.—Each daily discharge Aug. 25 to Dec. 31, 1912, is the average of 24 hourly discharges taken from the automatic record. Daily discharge based on a fairly well defined rating curve.

Monthly discharge of Swift River at West Ware, Mass., for 1912.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 25–31	73	37	55	0.288	0.07	A.
September 4 and 15–30	68	26	55	.288	.18	A.
October	84	24	53	.278	.32	A.
November	[a]188	38	107	.560	.62	A.
December	378	79	133	.696	.80	A.

[a] Part of day estimated.

QUABOAG RIVER AT WEST BRIMFIELD, MASS.

Location.—At the highway bridge near the West Brimfield station on the Boston & Albany Railroad.

Records available.—August 23, 1909, to December 31, 1912.

Drainage area.—150 square miles.

Gages.—Staff, attached to the upstream side of the right abutment of the bridge; read twice daily, August 23, 1909, to August 19, 1912. An automatic gage is set over a well just behind the center pier of the bridge. The automatic gage is sheltered by a wooden house 5 feet square over a timber well about 3 feet square. A staff gage on the outside of the gage well serves as a check on the automatic gage. The automatic gage and the original staff gage have the same datum and read the same at low stages. At high stages a perceptible slope in the river causes the automatic gage heights to read slightly lower than observations on the original staff.

Discharge measurements.—Made from the bridge during high stages and by wading near the bridge at low stages.

Winter flow.—Affected by ice.

Artificial control.—Mills above the station cause a very decided diurnal fluctuation in the discharge at this point. For this reason it is not advisable to attempt to estimate the daily discharge from semidaily gage readings at present. Therefore the gage reader's observations prior to the installation of the automatic gage are being published together with the flow corresponding to each.

Accuracy.—A good rating curve has been developed for this station, and estimates based on continuous records of gage height are good.

Discharge measurements of Quaboag River at West Brimfield in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 9[a]	McMillan and Canfield	3.59	97.4
Aug. 19	G. H. Canfield	1.62	11.8
26	do	1.92	42.3
26	do	2.39	142
Nov. 15	C. S. DeGolyer	2.40	157
16	do	2.53	177

[a] Measurement made under complete ice cover.

NOTE.—Measurements made by wading at various sections except as noted. Beginning Aug. 26, gage heights refer to new hook gage.

Gage height, in feet, and discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for 1910–1912.

[Mrs. W. E. Holland, observer.]

Day.	January.						February.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1910.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	8.45	2.0		4.50	3.4							
2	8.40	3.1		4.30	3.1							
3	8.30	3.1		4.30	3.2					5.00	3.2	
4	8.40	1.55		4.30	3.05							
5	8.40	1.6		4.45	3.1							
6	8.30	2.1		4.45	3.5					3.30	2.52	
7	9.00	4.48		4.45	4.4							
8	8.30	4.28		4.30	3.8							
9	8.00	3.1		4.35	3.4							
10	8.40	4.0		5.05	3.7					5.15	2.7	
11	8.30	4.0		4.50	3.3							
12	9.00	4.08		4.45	3.62							
13	8.30	4.1		4.40	3.65							
14	8.00	4.05								.30	2.9	
15				4.45	3.6							
16	8.00	3.2		4.45	3.05							
17	8.00	3.3		5.00	2.9							
18	8.30	3.4					10.30	2.9				
19										4.30	3.0	
20										3.00	2.6	
21										5.00	2.9	
22	7.30	5.92										
23							8.00	2.5				
24										4.00	3.2	
25							8.30	3.1				
26				5.00	3.62					4.30	3.0	
27							11.30	3.0				
28										4.00	5.1	
29												
30												
31				5.00	3.3							

Gage height, in feet, and discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for 1910–1912—Continued.

Day.	March.						April.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1910.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	8.15	4.9	1,660				9.00	3.08	371	6.00	3.0	335
2				5.00	4.62	1,410	8.30	3.03	348	5.30	2.8	252
3	8.15	4.52	1,320	5.15	4.55	1,340	8.00	2.8	252	5.00	2.8	252
4	9.15	4.45	1,260	5.30	4.45	1,260	9.10	2.95	313	5.15	2.78	245
5	8.30	4.35	1,180	5.00	4.3	1,140	8.30	3.1	380	6.00	2.7	217
6	9.20	4.2	1,060		4.17	1,040	8.30	3.1	390	6.00	2.7	217
7	8.30	4.38	1,200	5.00	4.35	1,180	8.15	3.1	380	6.00	2.6	185
8	8.00	4.3	1,140	5.30	4.23	1,080	7.25	2.58	179	4.00	2.74	231
9	8.30	4.2	1,060	5.00	4.15	1,020	8.30	2.8	252	6.00	2.6	185
10	9.00	4.05	945	5.30	3.98	896	8.00	2.4	131	5.30	2.4	131
11	9.00	3.95	875	5.15	3.88	726	8.50	2.78	245	6.00	2.6	185
12	8.00	3.85	805	4.45	3.8	770	9.00	3.0	335	6.00	2.85	272
13	8.00	3.6	645	4.50	3.6	645	9.00	3.04	353	6.15	2.7	217
14	8.30	3.7	705	5.10	3.48	574	8.15	3.0	335	4.45	2.65	201
15	8.10	3.5	585	5.15	3.38	520	8.00	2.88	283	5.00	2.6	185
16	8.45	3.4	530	5.15	3.4	530	8.00	2.78	245	6.15	2.5	156
17	8.40	3.3	480	5.20	3.5	585	8.00	2.5	156	5.00	2.8	252
18	8.45	3.4	530	5.10	3.3	480	8.45	2.9	291	3.4	2.62	191
19	8.30	3.3	480	5.20	3.13	395	9.00	2.85	272	6.00	2.9	291
20	8.00	3.1	380	4.30	3.1	380	9.00	3.2	430	5.15	2.84	268
21	9.15	3.25	455	5.00	3.2	430	6.15	2.78	245	5.30	2.78	245
22	9.15	3.28	470	5.10	3.08	371	9.00	2.98	326	5.30	2.7	217
23	8.00	3.0	335	4.30	3.10	380	9.00	3.0	335	5.45	2.68	211
24	9.00	3.14	400	6.00	3.04	353				5.00	2.62	191
25	8.45	3.12	390	5.15	3.0	335	9.00	3.0	335	4.45	2.6	185
26	9.00	3.12	390	4.45	2.9	291	8.45	3.0	335	6.00	2.98	326
27	8.00	2.96	417	4.30	2.96	317	9.00	3.2	430	6.00	3.1	380
28	8.00	3.10	380	5.15	2.98	326	9.00	3.12	390	6.10	2.9	291
29	8.45	3.12	390	5.35	2.90	291	9.00	3.3	480	6.00	2.6	185
30	9.00	3.08	371	5.00	3.0	335	8.45	3.1	380	5.30	2.7	217
31	9.00	3.10	380	6.10	2.95	313						

Day.	May.						June.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1910.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.00	3.1	380	4.00	2.85	272	8.30	3.0	335	4.30	2.5	156
2	9.15	3.2	430	5.30	2.7	217	8.30	2.9	291	5.10	2.52	162
3	8.45	3.03	348	6.00	2.74	231	8.45	2.8	252	5.15	2.4	131
4	8.45	3.0	335	5.45	2.7	217	8.30	3.0	335	5.00	1.65	14
5	9.00	3.0	335	5.30	2.78	245	8.15	2.2	89	4.15	2.3	109
6	9.15	3.1	380	5.45	2.73	228	8.20	2.42	136	4.45	2.52	162
7	6.45	2.7	217	6.00	2.6	185	8.20	2.9	291	4.45	2.5	156
8	8.30	2.6	185	5.45	2.6	185	8.00	2.35	120	4.45	2.5	156
9	9.15	2.88	283	6.00	2.8	252	7.45	2.32	113	4.00	2.52	162
10	8.45	2.9	291	5.00	2.65	201	8.00	2.35	120	4.15	2.52	162
11	9.00	2.85	272	5.20	2.67	207	8.20	2.65	201	4.00	2.6	185
12	8.30	2.9	291	5.30	2.7	217	8.00	2.6	185	4.30	2.65	201
13	8.30	3.0	335	5.17	2.65	201	9.00	3.03	348	4.15	2.6	185
14	9.00	2.88	283	5.30	2.5	156	8.40	2.68	211	4.30	2.58	179
15	8.45	2.55	170	4.30	2.6	185	8.35	2.68	211	4.00	2.65	201
16	8.45	2.9	291	5.00	2.6	185	8.45	3.2	430	4.30	2.7	217
17	8.45	2.98	326	5.00	2.68	211	8.00	2.68	211	5.00	3.08	371
18	8.50	2.9	291	2.35	2.2	89	8.10	2.65	201	4.30	2.38	127
19				4.45	2.58	179	8.00	2.4	131	5.00	2.45	144
20	9.00	2.93	304	7.30	2.5	156	8.10	2.52	162	5.30	2.45	144
21	10.30	2.65	201	6.45	2.55	170	8.20	2.85	272	6.30	2.4	131
22	9.00	2.6	185	7.55	2.65	201	8.30	2.9	291	5.15	2.58	179
23	9.00	2.78	245	4.25	2.52	162	8.20	2.88	283	4.30	2.5	156
24	9.15	2.83	264	7.45	2.65	201	8.15	2.88	283	4.40	2.5	156
25	9.00	2.8	252	4.35	2.52	162	8.15	2.82	260	4.30	1.6	11
26	8.00	2.5	156	4.3	2.52	162	8.00	2.2	89	4.00	2.28	105
27	7.45	2.42	136	4.25	2.55	170	8.00	2.35	120	5.30	2.4	131
28	7.40	2.4	131	4.00	2.5	156	8.10	1.6	11	4.20	2.35	120
29	9.00	2.52	162	4.15	2.52	162	7.40	1.52	7	4.15	2.35	120
30	9.15	2.25	99	5.30	2.20	89	7.45	1.58	10	4.30	2.3	109
31	8.40	2.2	89	5.05	2.42	136						

Gage height, in feet, and discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for 1910–1912—Continued.

Day.	July.						August.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1910.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	8.05	2.15	80	4.30	2.32	113	8.30	2.35	120	5.30	2.68	211
2	8.15	2.82	260	5.30	1.65	14	9.00	2.4	131	5.40	2.6	185
3	8.15	2.0	54	4.15	2.0	54	9.00	1.68	17	5.30	2.32	113
4	8.05	2.1	71	......	......	......	9.15	1.12	0	5.30	2.25	99
5	8.10	2.0	54	4.30	2.2	89	9.00	1.65	14	5.15	2.3	109
6	8.00	1.82	29	4.30	2.2	89	8.15	1.68	17	4.30	1.8	27
7	8.15	1.82	29	5.00	2.2	89	8.00	1.85	33	4.30	1.9	39
8	8.15	1.82	29	4.30	2.2	89	8.00	1.98	51	4.40	2.38	127
9	8.20	1.74	22	4.00	2.45	144	8.00	1.6	11	4.50	2.5	156
10	8.00	1.7	18	4.30	1.7	18	8.00	1.6	11	5.30	2.85	272
11	8.20	1.88	37	......	2.3	109	8.25	1.88	37	5.30	2.3	109
12	8.15	1.8	27	5.30	2.1	71	8.20	1.92	42	5.45	2.3	109
13	10.00	2.5	156	5.40	2.5	156	8.20	1.9	39	5.00	2.3	109
14	8.00	1.6	11	5.30	2.5	156	8.00	2.0	54	4.30	2.0	54
15	8.00	1.64	14	4.30	1.75	22	9.30	2.7	217	5.00	2.3	109
16	7.50	1.68	17	4.00	1.65	14	8.30	1.7	18	5.20	2.3	109
17	8.00	1.7	18	6.00	1.9	39	8.15	1.65	14	4.30	2.3	109
18	8.00	1.9	39	6.20	2.3	109	8.15	1.62	12	5.00	2.3	109
19	8.10	1.65	14	4.40	2.28	105	8.15	1.65	14	5.10	2.3	109
20	8.40	1.65	14	4.15	2.3	109	9.30	2.4	131	5.10	1.65	14
21	8.15	1.65	14	4.30	2.35	120	8.00	1.65	14	4.00	1.7	18
22	8.15	1.68	17	4.30	2.28	105	9.00	2.3	109	5.30	2.2	89
23	8.20	1.65	14	4.30	1.65	14	8.30	1.65	14	5.15	2.25	99
24	7.45	1.8	27	4.00	1.85	33	8.20	1.62	12	5.00	2.2	89
25	8.30	1.97	50	4.30	2.35	120	8.30	1.65	14	5.30	2.0	54
26	8.40	1.7	18	5.00	2.28	105	8.15	1.6	11	5.30	2.0	54
27	8.00	1.38	2	4.40	2.3	109	8.20	1.6	11	6.00	1.5	6
28	8.40	1.68	17	4.30	2.28	105	8.00	1.65	14	5.00	1.95	46
29	8.40	1.65	14	4.40	2.25	99	8.40	2.55	170	5.00	1.6	11
30	8.00	1.58	10	4.30	1.8	27	8.45	2.5	156	5.35	1.95	46
31	8.00	2.0	54	6.00	2.12	75	8.15	1.6	11	6.00	2.0	54

Day.	September.						October.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1910.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	8.50	1.95	46	6.00	2.25	99	8.40	1.52	7.0	5.00	1.55	8.5
2	8.40	1.75	22	5.30	2.0	54	8.30	1.55	8.5	4.30	1.6	11
3	8.45	1.75	22	5.30	1.75	22	9.10	2.4	131	5.00	2.0	54
4	8.00	1.9	39	3.00	2.0	54	8.35	1.52	7.0	5.25	2.0	54
5	8.20	2.1	71	4.00	2.1	71	8.50	1.62	12	5.30	2.0	54
6	8.15	2.0	54	5.30	2.3	109	8.30	1.6	11	5.20	2.0	54
7	8.15	1.78	25	5.30	2.4	131	8.30	1.6	11	5.40	2.0	54
8	8.20	1.65	14	5.30	2.3	109	8.30	1.6	11	5.00	1.6	11
9	8.50	1.78	25	5.30	2.3	109	8.45	1.6	11	4.30	1.6	11
10	8.25	1.7	18	5.00	1.7	18	8.30	1.6	11	4.45	2.0	54
11	10.00	2.0	54	5.00	2.0	54	9.00	1.72	20	5.00	2.2	89
12	8.15	2.0	54	2.50	2.3	109	8.45	1.52	7.0	5.30	2.3	109
13	8.00	1.5	6.0	5.15	2.2	89	9.00	1.55	8.5	5.30	2.2	89
14	8.15	1.52	7.0	5.30	2.2	89	8.40	1.52	7.0	5.30	2.2	89
15	8.00	1.5	8.0	5.00	2.2	89	8.30	1.55	8.5	5.00	1.75	22
16	8.30	1.6	11	5.30	2.25	99	8.30	1.8	27	4.00	1.8	27
17	8.20	1.6	11	5.00	1.4	2.5	8.30	1.8	27	5.15	2.1	71
18	8.00	1.4	2.5	5.00	1.4	2.5	8.20	1.65	14	3.50	1.75	22
19	9.00	2.12	75	5.10	2.2	89	8.30	1.68	17	5.20	2.1	71
20	8.30	1.6	11	5.30	2.3	109	8.25	1.65	14	5.00	1.9	39
21	8.30	1.6	11	5.30	2.3	109	8.30	1.68	17	5.30	2.1	71
22	9.00	1.6	11	5.00	2.12	75	8.25	1.65	14	5.00	1.62	12
23	8.40	1.62	12	5.30	2.3	109	8.20	1.65	14	5.00	1.65	14
24	8.45	1.6	11	5.40	1.7	18	8.30	1.68	17	5.30	2.1	71
25	8.30	1.8	27	5.00	1.8	27	8.30	1.55	8.5	5.45	2.05	62
26	8.30	1.8	27	5.30	2.3	109	8.25	1.55	8.5	5.45	2.05	62
27	8.40	1.7	18	5.30	2.2	89	8.25	1.52	7.0	5.45	2.08	68
28	8.30	1.6	11	5.30	2.2	89	8.45	1.6	11	4.40	1.8	27
29	8.25	1.52	7.0	5.40	2.15	80	9.00	1.62	12	5.00	1.75	22
30	8.30	1.52	7.0	5.25	2.0	54	9.00	1.75	22	4.40	1.75	22
31	......	......	......	......	......	......	8.35	1.78	25	4.40	1.8	27

Gage height, in feet, and discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for 1910–1912—Continued.

Day.	November.						December.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1910.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.10	1.65	14	5.00	2.0	54	8.30	1.65	14	3.00	2.04	61
2	8.50	1.65	14	5.00	2.0	54	8.20	1.62	12	4.30	2.0	54
3	8.50	1.68	17	4.40	2.1	71	8.30	1.65	14	5.00	1.75	22
4	8.30	1.65	14	5.00	2.1	71	8.00	1.75	22	4.20	1.75	22
5	8.50	1.65	14	4.00	1.9	39	8.40	1.8	27	4.30	1.9	39
6	8.00	1.9	39	4.00	1.95	46	8.30	1.68	17	3.30	2.2	89
7	8.40	2.0	54	4.50	2.3	109	8.40	1.65	14	4.30	2.0	54
8	8.50	1.75	22	4.40	2.35	120	8.30	1.7	18	4.40	1.95	46
9	8.30	1.53	7.5	4.30	2.38	127	8.45	1.68	17	4.00	2.2	89
10	8.30	1.58	10	5.00	2.35	120	8.30	1.65	14	4.00	1.65	14
11	8.30	1.78	25	4.30	2.35	120	8.20	1.68	17	4.30	1.7	18
12	8.40	1.75	22	4.00	1.88	37	8.30	1.75	22	3.30	2.1	71
13	8.00	1.9	39	4.00	1.9	39						
14	8.40	1.95	46	4.45	2.3	109						
15	8.30	1.78	25	4.40	2.35	120						
16	8.30	1.65	14	4.25	2.3	109						
17	8.30	1.6	11	4.40	2.3	109						
18	8.30	1.58	10	4.35	2.28	105						
19	8.45	1.65	14	4.40	1.65	14						
20	9.00	1.68	17	4.00	1.68	17						
21	9.15	2.5	156	4.20	2.2	89	8.30	1.65				
22	8.40	1.68	17	4.30	2.2	89						
23	8.30	1.65	14	4.00	2.05	62						
24	8.30	1.58	10	4.10	2.25	99	9.10	3.3				
25	9.15	2.5	156	4.30	2.2	89						
26	9.00	1.9	39	4.00	1.65	14						
27	8.20	1.6	11	4.15	1.6	11				3.10	3.0	
28	8.30	1.65	14	4.20	2.1	71						
29	8.20	1.65	14	4.25	2.12	75						
30	8.40	1.65	14	4.25	2.12	75						
31										4.30	3.5	

Day.	January.						February.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1												
2												
3	9.30	3.0										
4										3.00	3.3	
5												
6												
7	9.30	3.7					8.45	3.2				
8												
9												
10	9.25	2.8								4.00	3.4	
11												
12												
13												
14				4.15	2.3							
15							11.30	3.0				
16	9.00	3.1										
17												
18										4.00	2.3	
19				5.00	3.3							
20												
21							11.30	2.4				
22												
23												
24				3.00	3.5							
25										4.00	2.35	
26												
27												
28				5.00	2.2							
29												
30												
31	9.00	3.1										

Gage height, in feet, and discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for 1910–1912—Continued.

Day.	March.						April.					
	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1				4.00	2.4		9.00	3.3	480	5.00	2.85	272
2							8.45	2.85	272	4.00	2.9	291
3							9.00	3.2	430	4.40	3.2	430
4	9.10	2.8					9.00	3.4	530	4.50	3.25	455
5							9.00	3.52	597	5.00	3.3	480
6	9.00	3.0					8.40	3.48	574	5.00	3.3	480
7							9.00	3.5	585	5.10	3.28	470
8							9.10	3.5	585	4.30	2.8	252
9							9.00	2.85	272	5.00	2.85	272
10							8.45	3.12	390	5.00	3.28	470
11				4.30	2.4		8.00	3.07	366	5.00	3.25	455
12							9.00	3.2	430	4.40	3.25	455
13							8.45	3.3	480	4.30	3.28	470
14	9.00	3.0					9.00	3.3	480	5.00	3.25	455
15							9.00	3.3	480	5.00	3.0	335
16							8.45	3.0	335	4.45	3.02	344
17				2.10	4.0		9.00	3.1	380	5.50	3.0	335
18							8.50	3.1	380	4.00	3.1	380
19							8.45	3.05	358	5.35	2.95	313
20							9.00	3.3	480	5.15	3.0	335
21	9.00	3.28					9.00	3.5	585	5.30	3.1	380
22							8.30	3.28	470	6.00	2.9	291
23							9.30	2.9	291	4.00	2.95	313
24							9.00	3.3	480	4.00	3.1	380
25				3.00	2.78		9.10	3.3	480	4.50	3.0	335
26							9.00	3.12	390	5.00	3.0	335
27							8.30	2.75	234	5.00	3.0	335
28	11.00	3.3					8.40	2.75	234	4.50	3.0	335
29							9.00	2.75	234	5.00	2.7	217
30							8.00	2.75	234	3.30	2.78	245
31	8.35	3.25										

Day.	May.						June.					
	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.	Time.	Gage height.	Dis-charge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.00	2.8	252	4.50	2.75	234	9.00	1.8	27	4.00	2.0	54
2	8.45	2.78	245	5.00	2.72	224	8.45	1.75	22	4.30	1.95	46
3	9.00	2.8	252	4.45	2.7	217	8.40	1.7	18	6.30	1.9	39
4	9.10	2.8	252	6.00	2.75	234	9.00	1.68	17	5.00	1.95	46
5	9.00	2.7	217	5.30	2.6	185	8.55	1.7	18	4.00	2.12	75
6	8.50	2.65	201	5.00	2.5	156	8.45	1.8	27	5.00	2.3	109
7	10.00	2.5	156	4.50	2.55	170	8.40	1.78	25	5.00	2.28	105
8	8.30	2.55	170	5.00	2.6	185	8.45	1.8	27	5.40	2.3	109
9	9.10	2.65	201	5.00	2.48	151	8.35	1.8	27	5.00	2.28	105
10	10.00	2.68	211	6.00	2.4	131	8.30	1.82	29	5.00	2.4	131
11	9.00	2.7	217	6.00	2.4	131	9.30	2.5	156	6.30	2.0	54
12	9.00	2.68	211	5.15	2.4	131	9.00	1.85	33	5.00	2.3	109
13	8.55	2.65	201	4.50	2.2	89	9.15	1.78	25	4.50	2.25	99
14	9.00	2.28	105	4.00	2.3	109	9.00	1.75	22	6.00	2.3	109
15	9.40	2.6	185	4.40	2.25	99	8.50	1.75	22	5.50	2.3	109
16	9.00	2.53	165	4.50	2.28	105	9.00	1.72	20	5.00	2.25	99
17	8.40	2.6	185	4.00	2.28	105	8.50	1.72	20	4.00	1.65	14
18	9.00	2.58	179	5.00	2.3	109	8.30	1.7	18	5.00	1.95	46
19	8.40	2.65	201	4.40	2.3	109	9.00	2.0	54	5.15	2.2	89
20	9.00	2.7	217	4.00	1.88	37	8.40	1.72	20	5.00	2.3	109
21	9.00	1.92	42	4.55	2.6	185	8.50	1.7	18	4.50	2.28	105
22	8.30	2.7	217	5.00	2.48	151	8.50	1.7	18	4.10	2.3	109
23	9.00	2.78	245	4.40	2.45	144	9.00	1.68	17	5.15	2.25	99
24	8.45	2.7	217	4.45	2.4	131	8.55	1.72	20	4.10	1.75	22
25	8.50	2.68	211	4.50	2.4	131	9.10	1.78	25	4.00	1.82	29
26	9.10	2.75	234	5.00	2.42	136	8.40	1.72	20	4.40	1.8	27
27	8.30	2.7	217	5.00	2.18	85	8.45	1.75	22	4.10	2.3	109
28	8.30	2.2	89	4.50	2.28	105	9.00	1.75	22	4.15	2.3	109
29	9.00	1.9	39	4.30	2.15	80	9.10	1.7	18	4.15	2.28	105
30	8.50	1.92	42	4.00	2.2	89	9.00	1.68	17	4.30	2.3	109
31	8.40	1.8	27	4.40	2.15	80						

Gage height, in feet, and discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for 1910–1912—Continued.

Day.	July.						August.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.00	1.7	18	12.40	2.25	99	9.00	1.6	11	5.00	1.98	51
2	9.40	1.78	25	6.00	1.8	27	8.45	1.65	14	5.00	1.95	46
3	9.15	1.8	27	4.40	2.3	109	8.45	1.6	11	4.50	1.95	46
4	9.00	1.8	27	5.00	1.8	27	8.50	1.62	12	5.10	2.0	54
5	9.10	1.78	25	4.40	2.28	105	8.45	1.6	11	5.30	1.65	14
6	9.00	1.78	25	5.10	2.28	105	9.00	1.65	14	4.00	1.7	18
7	8.40	1.8	27	5.00	2.3	109	10.00	1.9	39	5.00	2.25	99
8	9.00	1.78	25	4.50	1.75	22	9.00	1.6	11	4.40	2.25	99
9	9.00	1.5	6.0	3.00	1.5	6.0	9.00	1.58	10	4.00	2.3	109
10	8.40	1.6	11	5.00	2.4	131	8.45	1.55	8.5	5.00	2.3	109
11	8.45	1.64	14	6.00	2.4	131	8.50	1.5	6.0	5.10	2.28	105
12	8.40	1.6	11	6.00	2.4	131	9.00	1.52	7.0	5.00	1.5	6.0
13	9.00	1.58	10	4.00	2.38	127	9.00	1.55	8.5	4.00	1.55	8.5
14	9.10	1.6	11	6.00	2.4	131	9.10	1.58	10	5.30	2.2	89
15	8.40	1.55	8.5	5.00	1.5	6.0	9.00	1.5	6.0	......	......	......
16	9.00	1.53	7.5	4.00	1.55	8.5	9.00	1.52	7.0	6.30	2.25	99
17	8.40	1.55	8.5	5.00	1.85	33	8.45	1.5	6.0	5.00	2.25	99
18	9.00	1.58	10	5.00	1.8	27	8.30	1.5	6.0	4.40	2.28	105
19	11.00	2.0	54	4.45	1.8	27	9.00	1.55	8.5	4.00	1.5	6.0
20	8.45	1.55	8.5	5.00	1.85	33	9.15	1.55	8.5	4.00	1.58	10
21	9.00	1.55	8.5	4.50	1.85	33	9.00	1.58	10	4.00	2.0	54
22	9.00	1.5	6.0	4.00	1.6	11	9.00	1.5	6.0	5.00	2.05	62
23	9.10	1.6	11	4.40	1.65	14	8.45	1.52	7.0	4.50	2.0	54
24	9.00	1.68	17	5.00	1.85	33	8.50	1.5	6.0	5.00	1.98	51
25	9.00	1.72	20	5.00	1.9	39	8.45	1.55	8.5	5.15	2.0	54
26	8.45	1.7	18	4.45	1.98	51	9.00	1.52	7.0	4.00	1.58	10
27	8.50	1.7	18	5.00	1.95	46	9.00	1.55	8.5	4.10	1.58	10
28	9.00	1.65	14	5.10	2.0	54	8.40	1.6	11	5.00	2.0	54
29	8.45	1.55	8.5	4.00	1.6	11	8.40	1.88	37	5.00	2.3	109
30	9.00	1.68	17	6.10	2.2	89	9.00	1.9	39	4.45	2.3	109
31	9.10	1.65	14	6.00	2.2	89	8.45	2.0	54	5.00	2.25	99

Day.	September.						October.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.00	2.12	75	4.00	2.32	113	10.00	2.35	120	4.50	2.4	131
2	8.35	2.1	71	5.10	2.1	71	9.00	2.45	144	5.00	2.42	136
3	9.30	2.1	71	5.00	2.12	75	9.10	2.6	185	5.00	2.5	156
4	8.30	2.2	89	4.50	2.4	131	9.00	2.58	179	4.40	2.5	156
5	9.00	2.0	54	5.30	2.4	131	9.00	2.55	170	5.30	2.52	162
6	8.40	1.95	46	5.00	2.42	136	8.55	2.55	170	5.00	2.5	156
7	9.10	1.98	51	6.00	2.45	144	9.00	2.6	185	4.30	2.28	105
8	9.00	2.0	54	5.10	2.3	109	9.30	2.3	109	6.00	2.3	109
9	9.00	1.9	39	4.30	1.9	39	9.00	2.35	120	5.00	2.3	109
10	8.35	1.95	46	5.40	1.98	51	9.10	2.6	185	5.00	2.3	109
11	8.50	2.0	54	6.00	2.25	99	8.40	2.55	170	4.50	2.32	113
12	9.00	1.9	39	5.00	2.3	109	9.00	2.53	165	4.35	2.28	105
13	9.00	2.4	131	5.10	2.32	113	9.30	2.6	185	4.00	2.3	109
14	9.00	2.6	185	5.00	2.3	109	9.00	2.58	179	4.90	2.3	109
15	9.00	2.6	185	4.50	2.3	109	9.00	2.38	127	4.00	2.4	131
16	8.45	2.6	185	5.10	2.5	156	8.50	2.98	326	4.10	2.3	109
17	8.50	2.5	156	4.00	2.55	170	9.00	3.0	335	4.00	2.4	131
18	9.00	2.6	185	4.00	2.5	156	9.10	3.03	348	5.00	2.45	144
19	9.10	2.4	131	4.30	2.3	109	8.50	3.0	335	4.50	2.6	185
20	9.15	2.4	131	4.50	2.25	99	8.45	3.1	380	5.10	2.62	191
21	9.00	2.3	109	4.30	2.3	109	9.00	3.05	358	5.00	2.7	217
22	8.40	1.75	22	5.00	2.32	113	8.55	2.7	217	4.00	2.75	234
23	8.30	1.72	20	5.00	1.8	27	9.00	2.8	252	4.10	2.7	217
24	9.30	1.88	37	4.50	1.9	39	9.00	3.05	358	5.10	2.7	217
25	9.10	2.5	156	5.30	2.4	131	8.50	3.0	335	5.00	2.68	211
26	8.40	1.82	29	5.00	2.38	127	8.45	3.0	335	4.30	2.65	201
27	8.45	1.8	27	5.00	2.3	109	9.00	3.02	344	4.30	2.65	201
28	9.00	1.85	33	5.10	2.32	113	9.00	2.95	313	5.00	2.7	217
29	9.00	1.88	37	5.00	2.4	131	10.00	2.75	234	4.10	2.73	228
30	8.50	1.9	39	4.40	1.92	42	9.00	2.75	234	5.30	2.6	185
31	......	......	......	......	......	......	9.00	2.7	217	5.15	2.62	191

Gage height, in feet, and discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for 1910–1912—Continued.

Day.	November.						December.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1911.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.00	2.68	211	4.50	2.55	170	9.00	3.0	335	4.10	3.04	353
2	8.50	2.65	201	4.45	2.52	162	9.00	3.0	335	3.55	2.3	109
3	9.00	2.6	185	5.00	2.5	156	9.00	2.38	127	4.00	2.6	185
4	8.50	2.6	185	4.30	2.3	109	8.45	2.95	313	4.50	3.1	380
5	10.00	2,6	185	5.00	2.65	201	9.00	2.95	313	5.00	2.9	291
6	9.00	2.68	211	4.50	2.6	185	9.00	2.95	313	4.00	2.85	272
7	8.55	2.63	195	3.30	2.68	211	8.45	2.9	291	4.10	2.8	252
8	8.10	2.6	185	5.30	2.65	201	8.50	2.9	291	4.15	2.8	252
9	8.45	2.62	191	5.00	2.67	207	9.00	2.9	291	4.30	2.6	185
10	8.30	2.6	185	4.50	2.65	201	9.00	2.6	185	5.00	2.68	211
11	9.00	2.58	179	5.00	2.3	109	8.50	2.9	291	4.40	2.9	291
12	10.00	2.35	120	3.00	2.38	127	9.00	2.88	283	4.50	2.88	283
13	10.00	2.58	179	5.00	2.62	191	9.00	2.9	291	5.00	2.85	272
14	8.10	2.6	185	4.50	2.68	211	8.40	2.95	313	4.35	2.85	272
15	9.00	2.65	201	4.35	2.65	201	8.50	2.98	326	4.40	2.9	291
16	8.50	2.6	185	5.00	2.65	201	8.50	3.0	335	4.30	2.8	252
17	8.40	2.68	211	5.00	2.7	217	9.00	3.0	335	4.00	3.12	390
18	8.55	2.72	224	4.30	2.68	211	8.45	3.0	335	4.30	3.1	380
19	9.00	2.68	211	4.25	2.68	211	8.30	2.9	291	5.00	3.06	362
20	8.50	2.7	217	4.40	2.7	217	9.10	2.92	300	5.10	3.12	390
21	9.00	2.7	217	4.00	2.72	224	9.00	2.95	313	4.30	3.1	380
22	10.00	3.0	335	4.00	2.80	252	9.00	3.0	335	4.30	3.1	380
23	9.45	3.08	371	4.40	2.78	245	8.50	2.95	313	4.00	2.95	313
24	9.00	2.9	291	4.10	2.82	260	10.00	3.0	335	4.20	3.0	335
25	9.00	2.95	313	4.00	3.0	335	9.00	3.05	358	5.00	2.9	291
26	10.00	3.0	335	3.30	3.05	358	8.45	3.0	335	4.00	3.1	380
27	9.00	3.0	335	5.00	3.00	335	8.45	2.98	326	4.10	3.12	390
28	8.50	2.98	326	4.50	3.12	390	9.10	2.95	313	4.00	3.12	390
29	8.50	2.95	313	5.00	3.05	358	9.00	2.98	326	4.35	3.06	362
30	8.55	3.0	335	5.10	3.10	380	9.00	2.9	291	4.00	2.88	283
31							9.10	2.9	291	4.10	2.95	313

Day.	January.						March.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.00	3.1	380	4.30	3.12	390						
2	9.00	3.1	380	4.10	3.2	430						
3	8.30	3.5	585	4.15	3.2	430						
4	9.30	3.5	585	5.00	3.25	455						
5	8.40	3.8	770	5.00	3.38	520						
6	9.10	4.0	910	4.00	3.4	530						
7												
8												
9												
10												
11												
12												
13										4.20	6.2	
14							9.10	5.5	2,250	3.50	5.3	2,050
15							9.00	5.2	1,950			
16							8.00	4.35	1,180	4.00	4.3	1,140
17							9.00	4.3	1,140	4.30	4.28	1,120
18							9.30	4.25	1,100	4.00	4.2	1,060
19							9.00	4.2	1,060	3.45	4.1	980
20							8.30	4.0	910	4.00	3.9	840
21							9.15	3.9	840	4.30	3.8	770
22							9.00	3.7	705	5.00	3.7	705
23							8.55	3.65	675	4.00	3.62	657
24							9.00	3.6	645	4.10	3.6	645
25							9.45	3.6	645	4.30	3.6	645
26							9.00	3.55	615	5.00	3.5	585
27							9.30	3.5	585	5.10	3.5	585
28							8.50	3.5	585	4.45	3.53	603
29							9.00	4.0	910	5.50	4.2	1,060
30							8.50	4.1	980	5.00	4.0	910
31							10.00	4.0	910	4.30	4.0	910

Gage height, in feet, and discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for 1910–1912—Continued.

Day.	April.						May.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.00	4.0	910	4.50	4.0	910	9.10	3.28	470	6.30	3.25	455
2	8.40	4.0	910	5.00	4.0	910	9.00	3.25	455	6.00	3.22	440
3	8.50	4.0	910	4.10	4.0	910	8.50	3.22	440	5.00	3.2	430
4	9.00	4.0	910	4.30	4.0	910	10.00	3.2	430	6.10	3.2	430
5	9.30	4.0	910	5.00	4.0	910	9.00	3.22	440	6.00	3.2	430
6	8.30	4.0	910	4.50	3.95	875	8.50	3.22	440	6.30	3.2	430
7	10.00	3.95	875	5.00	3.95	875	8.00	3.2	430	5.50	3.2	430
8	9.00	3.92	854	4.40	3.9	840	8.30	3.2	430	5.30	3.18	420
9	8.45	3.9	840	5.00	3.9	840	8.30	3.18	420	6.15	3.15	405
10	9.30	3.9	840	4.10	3.92	854	8.45	3.18	420	6.30	3.18	420
11	9.00	3.92	854	5.00	3.9	840	9.10	3.2	430	5.30	3.1	380
12	10.00	3.88	826	5.30	3.85	805	10.00	3.15	405	5.30	3.15	405
13	9.00	3.8	770	5.00	3.8	770	8.30	3.2	430	5.00	3.2	430
14	9.10	3.78	757	5.00	3.75	738	8.30	3.18	420	6.00	3.2	430
15	8.40	3.7	705	4.35	3.7	705	8.45	3.2	430	6.10	3.2	430
16	9.00	3.65	675	4.50	3.65	675	9.00	3.18	420	6.00	3.18	420
17	9.00	3.7	705	4.10	3.7	705	8.00	3.25	455	5.00	3.22	440
18	9.10	3.75	738	5.10	3.75	738	9.00	3.2	430	4.50	3.2	430
19	9.30	3.8	770	5.40	3.88	826	9.00	3.2	430	6.00	3.2	430
20	10.00	3.85	805	4.50	3.85	805	8.30	3.22	440	5.55	3.2	430
21	9.00	3.8	770	4.00	3.8	770	8.50	3.18	420	6.00	3.15	405
22	9.10	3.8	770	4.10	3.78	757	8.30	3.2	430	6.10	3.2	430
23	9.00	3.75	738	5.50	3.75	738	9.00	3.2	430	5.00	3.22	440
24	8.40	3.75	738	6.00	3.7	705	8.00	3.2	430	......	......	......
25	8.55	3.68	693	5.00	3.65	675	8.30	3.25	455	6.00	3.1	380
26	9.00	3.6	645	5.10	3.55	615	9.00	3.1	380	5.30	3.15	405
27	9.00	3.45	558	5.00	3.35	505	9.30	3.25	455	5.50	3.2	430
28	10.00	3.35	505	5.50	3.35	505	8.30	3.15	405	6.00	3.15	405
29	8.30	3.35	505	5.10	3.35	505	8.50	3.15	405	5.30	3.1	380
30	9.30	3.32	490	5.30	3.32	490	9.00	3.12	390	4.50	3.1	380
31	9.00	3.3	480	6.00	3.3	480	9.00	3.1	380	5.00	3.1	380

Day.	June.						July.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.00	3.1	380	5.30	3.1	380	7.00	1.9	39	6.30	2.7	217
2	9.00	3.15	405	5.00	3.08	371	7.00	1.8	27	5.30	2.3	109
3	9.30	3.2	430	4.30	3.0	335	7.05	1.8	27	5.25	2.4	131
4	8.00	3.1	380	4.40	3.0	335	7.30	1.8	27	7.15	2.55	170
5	7.45	2.88	283	6.30	2.9	291	7.00	1.9	39	5.35	2.35	120
6	8.30	3.2	430	6.45	2.7	217	7.05	1.7	18	6.00	1.7	18
7	8.15	2.8	252	6.20	2.78	245	9.00	1.75	22	7.30	1.55	8
8	10.00	2.9	291	6.45	2.6	185	7.05	1.7	18	7.20	2.4	131
9	10.15	2.6	185	6.45	2.7	217	9.05	1.75	22	5.20	2.15	80
10	9.00	3.05	358	6.30	2.6	185	8.00	1.7	18	6.00	2.2	89
11	9.00	3.05	358	4.15	2.5	156	8.30	1.7	18	5.30	2.3	109
12	8.45	3.0	335	4.00	2.75	234	9.00	1.7	18	5.55	2.1	71
13	9.00	2.85	272	5.00	2.6	185	8.30	1.5	6	4.10	1.85	33
14	9.15	2.85	272	6.00	2.4	131	8.20	1.8	27	7.00	1.7	18
15	9.00	2.88	283	6.00	2.2	89	9.00	1.8	27	6.45	2.2	89
16	10.00	2.3	109	6.00	2.38	127	7.00	1.8	27	6.30	2.3	100
17	8.30	2.58	179	5.30	2.6	185	7.05	1.7	18	6.00	2.35	120
18	8.25	1.8	27	7.35	2.58	179	7.00	1.65	14	6.15	2.4	131
19	9.00	1.78	25	6.00	2.4	131	7.15	1.7	18	5.30	2.2	89
20	8.45	1.88	37	7.10	2.5	156	9.00	1.65	14	6.10	1.8	27
21	9.00	1.8	27	6.00	2.5	156	9.00	1.7	18	6.30	1.65	14
22	9.20	1.85	33	6.30	2.0	54	9.10	1.65	14	6.00	2.38	127
23	10.00	2.1	71	4.00	2.2	89	8.45	1.65	14	6.15	2.4	131
24	10.00	2.5	156	5.30	2.4	131	8.55	1.65	14	6.30	2.38	127
25	8.30	1.8	27	7.10	2.4	131	9.10	1.6	11	6.10	2.35	120
26	8.45	1.85	33	6.00	2.4	131	8.50	1.62	12	5.50	2.4	131
27	8.30	1.8	27	5.50	2.4	131	9.15	1.65	14	6.00	2.38	127
28	9.00	1.82	29	6.20	2.4	131	10.00	2.42	136	6.10	2.5	156
29	10.00	1.8	27	7.00	1.9	39	9.00	1.6	11	6.20	2.35	120
30	9.00	1.9	39	3.30	1.88	37	9.25	1.62	12	7.00	2.32	113
31	......	......	......	......	......	......	9.35	1.62	12	6.55	2.3	100

Gage height, in feet, and discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for 1910–1912—Continued.

Day.	August.						Day.	August.					
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.		Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*	1912.	*a. m.*	*Feet.*	*Sec.-ft.*	*p. m.*	*Feet.*	*Sec.-ft.*
1	9.00	1.6	11	6.60	2.3	109	16	9.00	1.62	12	6.00	2.3	109
2	8.45	1.62	12	6.10	2.3	109	17	9.30	1.62	12	6.15	1.85	33
3	9.10	1.6	11	6.30	1.98	51	18	10.00	1.95	46	4.30	2.03	59
4	9.15	2.1	71	6.40	2.28	105	19	9.00	2.03	59	6.00	2.3	109
5	9.15	2.3	109	5.30	2.32	113	20	9.00	1.62	12	6.10	2.3	109
6	9.00	1.62	12	6.00	2.3	109	21	9.00	1.62	12	5.50	2.32	113
7	9.00	1.65	14	6.10	2.3	109	22	8.50	1.62	12	6.00	2.4	131
8	8.45	1.6	11	6.55	2.32	113	23	9.20	1.6	11	5.00	2.32	113
9	9.20	1.68	17	6.10	2.3	109	24	9.45	1.7	18	5.50	1.7	18
10	9.00	1.68	17	6.00	1.8	27	25	....	....	....	6.00	2.0	54
11	10.30	1.9	39	6.30	2.0	54	26	7.45	1.91	40	4.00	2.0	54
12	9.30	2.05	62	6.15	2.3	109	27	8.00	1.7	18	6.00	2.4	131
13	9.00	1.68	17	6.00	2.3	109	28	8.00	1.73	21	6.10	2.1	71
14	9.00	1.68	17	6.30	2.3	109	29	8.00	1.7	18	5.35	2.3	109
15	11.10	2.28	105	6.45	2.3	109	30	8.00	1.71	19	5.40	2.1	71
							31	8.50	1.72	20	4.00	1.72	20

Daily discharge in second-feet of Quaboag River at West Brimfield, Mass., for 1912.

	Aug.	Sept.	Oct.	Nov.	Dec.		Aug.	Sept.	Oct.	Nov.	Dec.
1	....	23	46	42	44	16	....	67	31	62	90
2	....	53	31	[a] 40	86	17	....	47	32	63	87
3	....	81	19	....	96	18	....	42	31	81	82
4	....	53	....	[a] 90	94	19	[a] 60	36	21	58	96
5	....	50	....	83	91	20	65	36	18	48	99
6	....	50	....	50	90	21	60	25	47	38	76
7	....	27	[a] 50	65	82	22	65	15	47	50	94
8	....	23	[a] 26	140	99	23	63	60	57	42	143
9	....	68	32	123	[a] 87	24	33	35	42	48	159
10	....	48	39	111	[a] 59	25	41	[a] 28	32	79	192
11	....	[a] 48	47	81	64	26	74	35	35	46	304
12	....	....	41	104	70	27	56	39	43	[a] 58	183
13	....	....	24	82	....	28	43	[a] 30	78	[a] 55	130
14	....	....	51	112	....	29	47	....	54	51	135
15	....	....	33	93	....	30	45	[a] 72	[a] 40	56	186
						31	25	....	35	....	301

[a] Part of day estimated by interpolation and comparison.

NOTE.—Relation of gage height to discharge affected by ice Jan. 18 to Feb. 28, 1910, Dec. 13, 1910, to Mar. 31, 1911, and Jan. 7 to Mar. 13, 1912. Daily discharge determined from a well-defined rating curve. Discharges Aug. 19 to Dec. 31, 1912, are averages of 24 hourly observations taken from the automatic record.

Monthly discharge of Quaboag River at West Brimfield, Mass., for 1912.

[Drainage area, 150 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 19–31	74	25	52	0.347	0.17	A.
September	81	15	44	.293	.33	A.
October	78	18	37	.247	.28	A.
November	140	38	70	.467	.52	A.
December	304	44	113	.753	.87	A.

NOTE.—Discharge estimated Sept. 12–15, 29, Oct. 4–6, Nov. 3, and Dec. 13–15.

WESTFIELD RIVER AT KNIGHTVILLE, MASS.

Location.—At the steel highway bridge (locally known as the Pitcher Bridge) at Knightville, about 4½ miles north of the town of Huntington, 1 mile north of the outlet of Norwich Lake, and about 3 miles north of the junction with the middle branch of Westfield River.

Records available.—August 26, 1909, to December 31, 1912.

Drainage area.—162 square miles.

Gage.—Chain attached to the highway bridge; datum unchanged.

Channel.—Rough; bed composed of large gravel and ledge rock.

Discharge measurements.—Made from highway bridge.

Winter flow.—Relation between gage height and discharge during winter months affected by ice.

Artificial control.—It is believed that there is no mill control on this stream above the station.

Accuracy.—Discharge rating curve fairly well defined; estimates as published are good.

Discharge measurements of Westfield River at Knightville, Mass., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 7[a]	Alexander McMillan	1.95	105
Nov. 19	C. S. De Golyer	2.13	250
19	.....do	2.13	247

[a] Measurement made under complete ice cover at bridge.

Daily gage height, in feet, of Westfield River at Knightville, Mass., for 1912.

[G. A. Fisk and C. S. Burr, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3			3.8	2.7	2.5	1.14	0.90	1.18	1.12	1.78	1.84
2	2.15			4.3	2.5	2.35	1.14	.90	1.39	1.10	2.85	1.96
3	2.05			3.7	2.25	2.6	1.11	.91	1.08	1.15	2.55	3.8
4	2.05			3.1	2.15	2.4	1.00	.96	.99	1.15	2.05	2.8
5	2.0			3.4	2.15	2.25	1.00	.96	.97	1.15	1.90	2.3
6	2.1			3.5	2.4	2.1	1.00	.99	1.01	1.05	1.72	3.3
7	2.3	1.95		3.6	2.9	2.6	1.00	.92	1.00	1.00	1.85	3.0
8	2.3	1.92		4.5	2.7	2.3	1.00	.88	1.10	1.00	4.4	2.5
9	3.1	1.90		4.0	2.6	2.1	1.00	.80	1.06	1.00	3.4	2.2
10	4.2	1.93		4.0	2.5	1.92	.96	.92	1.08	1.00	3.5	2.25
11		1.90		3.6	2.7	1.90	.96	1.42	1.05	1.05	2.2	2.3
12		1.87		3.3	2.35	1.88	.96	1.64	1.08	1.28	2.2	2.2
13		1.88		3.3	2.7	1.86	.94	1.38	1.08	1.31	2.1	1.80
14		1.88		3.0	2.15	1.78	1.04	1.22	1.10	1.22	3.2	1.96
15		1.91	8.6	3.3	2.05	1.70	1.00	1.01	1.13	1.20	2.95	1.88
16		1.90	5.8	4.3	2.25	1.69	.96	.92	1.30	1.08	2.6	2.05
17	2.55	1.91	4.9	4.6	2.25	1.62	.95	.90	1.40	1.10	2.4	2.05
18		1.92	4.6	4.7	2.15	1.56	.96	1.49	1.32	.98	2.25	1.98
19		1.92	4.3	3.6	2.05	1.50	.94	1.46	1.27	1.02	2.1	2.65
20		1.92	3.9	3.1	2.0	1.46	.92	1.46	1.24	1.05	2.05	2.6
21		2.15	3.9	3.1	1.94	1.44	.96	1.36	1.23	.98	2.05	2.3
22		2.25	3.7	3.4	3.3	1.43	1.00	1.46	1.23	1.08	2.0	1.94
23		2.35	3.5	3.3	3.2	1.42	1.04	1.02	1.22	1.50	1.97	1.97
24		2.5	3.0	3.2	2.6	1.40	.98	.96	1.22	5.2	1.95	1.97
25		2.6	2.5	3.7	3.2	1.38	.96	.96	1.22	3.7	2.8	1.98
26		2.7	2.45	3.3	2.05	1.36	.95	1.12	1.18	3.0	2.4	2.0
27		3.0	2.35	3.0	1.96	1.27	.90	1.28	1.13	2.45	2.2	2.5
28			2.1	3.0	1.88	1.20	.90	1.11	1.08	2.0	2.05	2.5
29			5.0	2.95	1.84	1.16	.88	1.05	1.08	2.0	1.88	2.4
30			4.8	2.85	3.5	1.14	.84	.98	1.13	1.95	1.96	2.4
31			4.1		3.5		.86	.91		1.75		3.9

NOTE.—Relation of gage height to discharge affected by ice Jan. 9 to Mar. 14.

Daily discharge, in second-feet, of Westfield River at Knightville, Mass., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	320	......	......	1,180	510	410	41	20	46	39	148	164
2	262	......	......	1,500	410	342	41	20	73	37	592	198
3	228	......	......	1,120	300	460	38	21	35	42	435	1,180
4	228	......	......	735	262	365	28	25	27	42	228	565
5	210	......	......	920	262	300	28	25	26	42	180	320
6	245	......	......	985	365	245	28	27	29	32	134	855
7	320	105	......	1,050	620	460	28	22	28	28	166	675
8	320	......	......	1,640	510	320	28	19	37	28	1,570	410
9	......	......	......	1,310	460	245	28	13	33	28	920	280
10	......	......	......	1,310	410	186	25	22	35	28	985	300
11	......	......	......	1,050	510	180	25	77	32	32	280	320
12	......	......	......	855	342	175	25	116	35	53	280	280
13	......	......	......	855	510	169	23	71	35	61	245	153
14	......	......	......	675	262	148	32	50	37	50	795	198
15	......	......	4,860	855	228	129	28	29	40	48	648	175
16	......	......	2,580	1,500	300	127	25	22	60	35	460	228
17	......	......	1,920	1,710	300	112	24	20	74	37	365	228
18	......	......	1,710	1,780	262	101	25	88	63	26	300	204
19	......	......	1,500	1,050	228	90	23	84	56	30	245	485
20	......	......	1,240	735	210	84	22	84	53	32	228	460
21	......	......	1,240	735	192	80	25	68	52	26	228	320
22	......	......	1,120	920	855	79	28	84	52	35	210	192
23	......	......	985	855	795	77	32	30	50	90	201	201
24	......	......	675	795	460	74	26	25	50	2,130	195	201
25	......	......	410	1,120	795	71	25	25	50	1,120	565	204
26	......	......	388	855	228	68	24	39	46	675	365	210
27	......	......	342	675	198	56	20	58	40	388	280	410
28	......	......	245	675	175	48	20	38	35	210	228	410
29	......	......	1,990	648	164	44	19	32	35	210	175	365
30	......	......	1,850	592	985	41	16	26	40	195	198	365
31	......	......	1,380	......	985	......	17	23	......	141	......	1,240

NOTE.—Daily discharge from a discharge rating curve that is well defined; 1912 measurements indicate that this curve is somewhat different from the one formerly used.

Monthly discharge of Westfield River at Knightville, Mass., for 1912.

[Drainage area, 162 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March 15-31	4,860	245	1,440	8.89	5.62	B.
April	1,780	592	1,020	6.30	7.03	A.
May	985	164	422	2.60	3.00	A.
June	460	41	176	1.09	1.22	A.
July	41	16	26.4	.163	.19	C.
August	116	13	42.0	.259	.30	B.
September	73	26	43.5	.269	.30	B.
October	2,130	26	193	1.19	1.37	A.
November	1,570	134	395	2.44	2.72	A.
December	1,240	153	381	2.35	2.71	A.

MIDDLE BRANCH OF WESTFIELD RIVER AT GOSS HEIGHTS, MASS.

Location.—At a single-span highway bridge in the hamlet of Goss Heights, about 1½ miles above the village of Huntington and half a mile above the confluence of the Middle Branch and the North Branch of Westfield River.

Records available.—July 14, 1910, to December 31, 1912.

Drainage area.—53 square miles.

Gages.—Standard chain gage attached to the upstream side of the bridge, read twice daily from July 14, 1910, to September 7, 1912. Beginning September 8, 1912, an automatic gage on the right bank at the upstream side of the bridge abutment was used. The automatic gage is protected by a wooden shelter about 5 feet square and set over a timber well about 3 feet square. The well is connected with the river by a 4-inch cast-iron pipe, having its outer end immediately under the chain gage. A sloping staff gage is set in the bank of the river practically over the intake to serve as a check on the automatic and chain gages.

Channel.—Coarse gravel and permanent.

Discharge measurements.—Made by wading at low and medium stages and from the highway bridge at high stages.

Artificial control.—The operation of a power plant about 2 miles above the station causes some diurnal fluctuation in the flow of this stream at low stages.

Discharge measurements of Middle Branch of Westfield River at Goss Heights, Mass., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 8[a]	G. H. Canfield	2.54	35.3	Oct. 29	J. G. Mathers	1.42	63.1
May 22	G. K. Larrison	1.96	256	29	do	1.41	59.4
Sept. 7[b]	G. H. Canfield	1.12	13.1	Nov. 20	C. S. De Golyer	1.47	74.2
8[b]	do	1.11	12.7	20[d]	do	1.46	66.2
9[c]	do	1.04	6.79	Dec. 19	do	1.98	243

[a] Measurement made under complete ice cover 75 feet below bridge.
[b] Measurement made by wading 500 feet below bridge.
[c] Measurement made by wading 200 feet above bridge.
[d] Measurement made by wading 300 feet below bridge.

Daily gage height, in feet, of Middle Branch of Westfield River at Goss Heights, Mass., for 1912.

[Monroe Rising, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.7	2.8		2.4	1.82	1.35	1.04	1.05	1.05
2	1.6			2.4	1.78	1.2	1.02	1.02	1.86
3	1.55			3.0	1.7	2.1	1.01	1.10	1.68
4			2.65	2.65	1.69	1.85	1.01	1.12	1.48
5				2.5	1.6	1.35	1.00	1.10	1.25
6		2.85		2.6	1.82	1.35	.99	1.02	1.20
7			2.6	2.7	1.9	1.32	.99	1.02	1.18
8	1.9	2.55		2.65	1.88	1.3	.99	.90	
9				2.6	1.9	1.42	1.00	.90	
10				2.3	1.85	1.4	.99	.89	
11	2.1			2.2	1.81	1.38	.98	1.14	
12		2.6	2.9	2.1	1.69	1.34	1.00	1.05	
13				2.0	1.65	1.31	1.08	1.05	
14	2.25		2.1	1.98	1.62	1.29	1.14	1.05	
15			3.7	1.96	1.92	1.28	1.12	1.01	
16			4.5	1.95	1.88	1.25	1.09	1.00	
17			3.3	2.7	1.85	1.3	.90	.99	
18	2.35		2.85	2.6	2.15	1.24	.90	.98	
19		2.4	2.8	2.6	2.1	1.21	1.10	1.15	
20			2.7	2.3	1.95	1.2	1.08	1.14	
21	2.9		2.7	1.92	1.8	1.18	1.00	1.34	
22			2.65	1.86	2.2	1.18	1.10	1.20	
23			2.6	1.81	2.1	1.15	1.05	1.10	
24		2.8	2.4	1.75	1.9	1.12	1.02	1.20	
25	2.7		2.15	1.7	1.72	1.12	1.00	1.10	
26			1.91	1.66	1.65	1.1	1.00	1.10	
27			2.05	1.62	1.6	1.1	.98	1.08	
28			1.76	1.71	1.51	1.09	.90	1.10	
29	2.8		2.85	1.69	1.46	1.09	.88	1.04	
30			2.8	1.82	1.4	1.05	.80	1.10	
31			2.5		1.38		1.00	1.09	

NOTE.—Relation of gage height to discharge affected by ice Jan. 4 to Mar. 13. Daily gage height Sept. 9 to Dec. 31 not computed. See note under daily discharge table.

Daily discharge, in second-feet, of Middle Branch of Westfield River at Goss Heights, Mass., for 1910–1912.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.							1910.						
1	......	7.8	8.6	6.9	6.9	21	16	8.6	10	6.9	5.2	22	......
2	......	10	8.6	4.4	8.6	24	17	6.9	7.8	4.4	6.9	24	......
3	......	7.8	0	......	48	29	18	7.8	7.8	5.2	3.5	23	......
4	......	7.8	68	......	138	......	19	5.2	26	4.4	......	32	......
5	......	23	113	......	322	......	20	7.8	29	4.4	......	55	......
6	......	16	94	4.4	212	......	21	8.6	7.8	......	......	68	......
7	......	11	196	10	68	......	22	10	5.2	......	11	36	......
8	......	8.6	122	6.9	48	......	23	7.8	5.2	......	14	30	......
9	......	8.6	48	7.8	42	......	24	6.9	8.6	......	12	35	......
10	......	7.8	30	8.6	26	......	25	7.8	6.9	......	13	26	......
11	......	23	13	6.9	59	......	26	5.2	4.4	7.8	10	85	......
12	......	23	11	4.4	42	......	27	6.9	7.8	6.9	6.9	29	......
13	......	12	7.8	6.9	40	......	28	8.6	8.6	13	5.2	35	......
14	5.2	11	6.9	4.4	30	......	29	12	7.8	8.6	11	46	......
15	6.9	14	6.9	6.9	30	......	30	10	7.8	4.4	12	30	......
							31	8.6	7.8	......	13	......	......

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	......	......	......	152	135	66	14	11	42	53	119	104
2	......	......	......	132	212	49	12	12	53	196	110	96
3	......	......	......	110	170	30	10	13	29	181	96	102
4	......	......	......	96	138	24	7.8	11	24	142	59	83
5	......	......	......	110	113	21	6.9	10	16	135	55	83
6	......	......	......	1,030	102	66	13	8.6	24	119	48	91
7	......	......	......	860	83	336	12	7.8	18	166	278	104
8	......	......	......	535	62	192	11	10	13	173	196	104
9	......	......	......	300	71	91	7.8	8.6	16	110	173	110
10	......	......	......	255	71	110	6.9	7.8	85	83	145	96
11	......	......	......	238	68	75	5.2	5.2	91	71	110	83
12	......	......	......	196	59	96	3.5	3.5	78	59	83	80
13	......	......	......	221	66	435	11	......	75	49	152	78
14	......	......	......	300	62	234	7.8	......	57	36	138	78
15	......	......	......	585	59	135	13	......	46	29	177	102
16	......	......	......	322	66	71	8.6	48	59	24	177	156
17	......	......	......	221	42	66	10	16	48	24	177	345
18	......	......	......	177	40	48	30	13	26	59	159	204
19	......	......	......	177	91	40	14	11	22	1,760	300	142
20	......	......	......	216	126	40	16	5.2	19	560	216	96
21	......	......	......	189	102	36	12	6.9	16	485	156	113
22	......	......	......	221	66	24	19	11	13	980	142	107
23	......	......	......	212	55	30	16	13	24	1,090	110	560
24	......	......	......	170	53	24	23	12	22	920	126	322
25	......	......	......	142	53	24	21	12	14	695	208	196
26	......	......	......	142	68	29	19	26	30	189	145	142
27	......	......	1,270	132	49	42	16	46	30	145	138	212
28	......	......	1,210	142	40	40	13	62	35	75	113	208
29	......	......	585	177	42	36	21	85	30	83	102	177
30	......	......	668	170	35	22	18	94	46	75	96	152
31	......	......	255	......	30	......	13	75	......	83	......	142
1912.												
1	138	......	......	435	181	48	6.9	7.8	7.8	9.8	46	60
2	107	......	......	435	166	23	5.2	5.2	196	6.9	126	110
3	94	......	......	750	138	300	4.4	12	132	8.0	90	475
4	......	......	......	560	135	192	4.4	14	75	......	65	195
5	......	......	......	485	107	48	3.5	12	30	......	47	139
6	......	......	......	535	181	48	3.2	5.2	23	......	43	306
7	......	......	......	585	212	42	3.2	5.2	21	......	......	210
8	......	......	......	560	204	38	3.2	......	20	......	......	148
9	......	......	......	535	212	62	3.5	......	20	......	......	109
10	......	......	......	390	192	57	3.2	......	7.9	......	......	115
11	......	......	......	345	177	53	......	16	5.2	......	......	86
12	......	......	......	300	135	46	3.5	7.8	6.1	......	......	78
13	......	......	......	255	122	40	10	7.8	4.5	......	......	112
14	......	......	300	246	113	36	16	7.8	4.5	......	......	141
15	......	......	1,150	238	221	35	14	4.4	4.0	......	245	121

Daily discharge, in second-feet, of Middle Branch of Westfield River at Goss Heights, Mass., for 1910–1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.												
16	......	......	1,690	234	204	30	11	3.5	13	......	139	104
17	......	......	920	585	192	38	......	3.2	15	......	109	76
18	......	......	668	535	322	29	......	......	10	......	97	59
19	......	......	640	535	300	24	12	18	7.9	......	84	163
20	......	......	585	390	234	23	10	16	6.7	......	70	152
21	......	......	585	221	173	21	3.5	46	5.6	5.8	66	104
22	......	......	560	196	345	21	12	23	4.0	......	62	88
23	......	......	535	177	300	18	7.8	12	5.2	......	58	117
24	......	......	435	156	212	14	5.2	23	4.9	......	83	161
25	......	......	322	138	145	14	3.5	12	4.9	311	158	234
26	......	......	216	126	122	12	3.5	12	5.1	187	101	216
27	......	......	278	113	107	12	2.9	10	4.2	123	85	292
28	......	......	159	142	83	11	......	12	4.4	97	72	151
29	......	......	668	135	71	11	......	6.9	5.1	79	67	112
30	......	......	640	181	57	7.8	......	12	5.0	68	63	337
31	......	......	485	......	53	......	......	11	......		......	447

NOTE.—Daily discharge tables for 1910–11 here published supersede those published in Water-Supply Papers 281 and 301. Measurements made during 1912 indicate that the rating curve is quite different from the one computed from 1910–11 measurements and is fairly well defined above 5 second-feet.

Mean daily discharge, Sept. 9, to Dec. 31, 1912, computed by scaling discharge for each hour from the automatic hydrograph. Twenty-four hourly discharges were then averaged to obtain the mean daily discharge. The gaps in this record are caused by stoppage of the clock before it was in proper adjustment.

Monthly discharge of Middle Branch of Westfield River at Goss Heights, Mass., for 1910–1912.

[Drainage area, 53 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910.						
July 14–31	12	5.2	7.82	0.148	0.10	B.
August	29	4.4	11.3	.213	.25	B.
November	322	6.9	54.9	1.04	1.16	A.
1911.						
April	1,030	96	264	4.98	5.56	A.
May	212	30	78.4	1.48	1.71	A.
June	435	21	84.4	1.59	1.77	A.
July	30	3.5	13.3	.251	.29	B.
September	91	13	36.7	.692	.77	B.
October	1,760	24	285	5.38	6.20	A.
November	300	48	1.44	2.72	3.04	A.
December	560	78	1.51	2.85	3.29	A.
1912.						
March 14–31	1,690	159	602	11.4	7.63	B.
April	750	113	351	6.62	7.39	B.
May	345	53	175	3.30	3.80	A.
June	300	7.8	45.1	.851	.95	A.
September	196	4.0	21.9	.413	.46	A.
December	475	59	168	3.17	3.65	A.

NOTE.—Data for 1910 and 1911, supersede those published in Water Supply Papers 281 and 301.

WESTFIELD LITTLE RIVER NEAR BLANDFORD, MASS.

Location.—At the intake dam for the waterworks for the city of Springfield, Mass., a short distance below Borden Brook and Stow Brook.

Records available.—July 13, 1905, to December 31, 1909, for a point just below Borden Brook (drainage area 43 square miles); March 1, 1910, to December 31, 1911, for present site. Data for 1912 not available.

Drainage area.—48 square miles.

Cooperation.—Records collected under the direction of E. E. Lochridge, chief engineer, board of water commissioners, city of Springfield, Mass.

Daily discharge, in second-feet, of Westfield Little River near Blandford, Mass., for 1910–11.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	126	0	1,010	135	94	98	8.1	14	0.0	0.0	8.5	21
2	125	21	708	107	73	70	.0	18	.0	.0	26	21
3	126	75	348	94	60	59	37	13	12	.0	43	17
4	125	35	177	71	43	51	16	9.4	5.1	.0	140	10
5	133	29	194	65	19	32	20	18	25	.0	167	16
6	144	59	220	79	15	161	8.8	22	27	7.1	82	16
7	138	74	398	33	9.4	131	22	0.0	20	.0	47	15
8	136	90	206	24	16	94	.0	0.7	23	.0	39	16
9	135	122	230	47	21	65	.0	8.1	16	.0	42	14
10	131	138	138	27	21	122	.0	24	13	.0	20	13
11	135	102	93	33	16	321	.0	61	28	.0	54	12
12	135	121	104	66	22	389	.0	23	14	.0	30	12
13	128	128	113	.54	35	246	.0	18	25	.0	36	4.7
14	132	103	79	32	72	127	42	16	.0	.0	31	7.6
15	128	111	64	63	59	99	15	25	.0	.0	23	4.0
16	125	110	76	63	28	85	16	9.5	.0	.0	21	2.4
17	128	112	99	64	48	112	34	13	.0	.0	21	1.0
18	125	226	63	74	53	111	18	6.6	.0	.0	18	6.1
19	128	288	96	127	78	93	17	9.6	.0	8.1	31	.0
20	125	274	139	127	56	63	20	11	.0	.0	36	.0
21	367	470	152	117	64	51	21	0.8	.0	.0	40	4.4
22	222	443	164	44	61	35	20	2.6	.0	.2	43	.0
23	334	237	215	35	57	29	15	6.6	2.0	6.5	43	.0
24	137	116	275	27	52	27	4.7	4.7	6.7	8.0	38	8.2
25	154	71	558	171	46	27	4.6	3.4	.0	8.0	.0	33
26	154	119	578	1,240	46	24	4.6	0.0	.0	8.1	23	34
27	137	197	273	496	45	24	.9	0.0	1.7	.0	15	33
28	149	639	181	128	38	26	.0	7.8	.0	.0	20	38
29	149	......	249	94	32	0	5.8	15	24	.0	19	28
30	147	......	312	105	32	15	11	3.1	2.9	6.9	15	34
31	137	......	206	......	138	......	20	16	......	......	......	54
1911.												
1	78	22	18	131	109	39	12	16	135	104	103	101
2	67	30	26	112	137	39	13	1.5	78	270	118	83
3	183	18	20	95	121	25	3.9	5.2	44	158	79	79
4	188	33	22	89	96	25	5.8	18	40	150	76	78
5	85	24	28	177	82	38	7.2	15	20	139	93	68
6	83	28	21	663	74	116	2	14	28	94	66	64
7	36	19	21	505	65	357	27	.0	23	144	195	66
8	38	25	29	268	66	214	17	.0	82	128	139	45
9	49	19	20	184	63	123	18	.9	237	89	113	55
10	54	17	20	170	56	75	.14	11	162	67	85	47
11	31	17	28	186	43	29	.0	9.3	160	59	73	63
12	44	3.2	23	164	41	89	.0	10	128	43	80	75
13	34	6.6	31	158	58	365	6.9	9.8	83	48	93	54
14	33	30	40	221	38	245	31	8.8	52	33	92	69
15	34	20	55	289	44	128	4.3	18	46	42	167	67
16	30	16	32	210	34	84	8.0	71	50	30	136	174
17	25	24	31	148	33	67	11	25	43	38	116	226
18	31	23	32	124	21	44	22	14	42	665	188	165
19	28	25	31	117	117	46	17	16	25	1,280	310	123
20	11	25	82	161	141	27	17	16	21	553	209	76
21	15	19	47	220	84	22	2.1	16	30	710	169	74
22	18	18	140	195	36	19	9.0	13	27	806	129	140
23	5.5	15	93	146	60	18	9.6	4.8	26	636	124	352
24	14	22	99	134	33	18	64	5.6	30	325	163	209
25	17	17	99	121	42	30	68	8.2	20	341	185	171
26	114	28	148	103	76	20	20	8.1	56	175	114	151
27	44	25	650	99	57	20	37	22	33	155	91	175
28	90	23	405	133	37	20	19	21	33	128	92	138
29	121	......	260	111	20	.82	19	137	55	107	113	106
30	46	......	223	115	29	38	14	110	83	101	128	102
31	40	......	169	......	17	......	7.9	115	......	80	......	110

NOTE.—Daily discharge originally computed in terms of million gallons per 24 hours; converted into second-feet by engineers of the Survey.

Monthly discharge of Westfield Little River near Blandford, Mass., for 1910–11.

[Drainage area, 48 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1910.					
January	334	125	150	3.12	3.60
February	639	0.0	161	3.35	3.49
March	1,010	63	252	5.25	6.05
April	1,240	24	128	2.67	2.98
May	138	9.4	47	.979	1.13
June	389	.0	93	1.94	2.16
July	42	.0	12	.250	.29
August	61	.0	12	.250	.29
September	28	.0	8.2	.171	.19
October	3.1	.0	1.7	.035	.04
November	167	.0	39	.812	.91
December	54	.0	15	.312	.36
The year	1,240	.0	76.6	1.60	21.49
1911.					
January	188	5.5	50	1.04	1.20
February	33	3.2	21	.438	.46
March	650	18	93	1.94	2.24
April	663	89	184	3.83	4.27
May	141	17	62	1.29	1.49
June	365	.8	79	1.65	1.84
July	68	.0	16	.333	.38
August	137	.0	24	.500	.58
September	237	20	63	1.31	1.46
October	1,280	30	248	5.17	5.96
November	310	66	133	2.77	3.09
December	352	45	113	2.35	2.71
The year	1,280	0	90.5	1.89	25.68

NOTE.—Figures represent the natural flow of the stream excepting that no correction is made for evaporation and seepage from the reservoirs.

Discharge computed by Mr. Lochridge in million gallons per day; converted into second-feet by engineers of United States Geological Survey.

BORDEN BROOK NEAR BLANDFORD, MASS.

Location.—Near the town of Blandford, Mass., at the storage reservoir for the water supply of the city of Springfield, Mass.

Records available.—March 1, 1910, to December 31, 1911; records for 1912 not available.

Drainage area.—7.95 square miles.

Cooperation.—Data for publication collected under the direction of E. E. Lochridge, chief engineer, board of water commissioners, city of Springfield, Mass.

Daily discharge, in second-feet, of Borden Brook near Blandford, Mass., for 1910–11.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	1.4	0.0	93	15	22	8.1	7.3	0.0	0.0	0.0	8.5	0.0
2	.0	3.2	132	.0	22	7.6	7.3	.0	.0	.0	26	.0
3	1.5	6.4	57	20	20	7.6	18	.0	12	.0	43	.0
4	.0	6.4	41	20	17	7.8	7.3	.0	4.7	.0	36	.0
5	7.9	6.4	59	10	16	10	13	.0	.0	.0	1.2	.0
6	19	6.4	85	20	13	14	1.8	.0	9.9	7.1	19	.0
7	14	6.5	95	10	10	17	18	.0	.0	.0	1.2	.0
8	11	6.5	62	21	8.6	20	18	.0	.0	.0	1.2	.0
9	11	6.5	71	10	9	23	7.3	.0	.0	.0	1.7	.0
10	6.5	6.5	45	.0	13	27	.0	.0	9.9	.0	.0	.0
11	9.8	6.5	9.1	10	14	32	.0	.0	.0	.0	.0	.0
12	9.8	6.5	27	10	13	32	.0	.0	14	.0	.0	.0
13	3.3	13	27	10	12	32	.0	.0	25	.0	.0	.0
14	7.1	6.5	18	10	11	31	.0	.0	.0	.0	.0	.0
15	3.6	6.5	18	10	10	24	.0	.0	.0	.0	.0	.0
16	.0	13	18	11	9.4	17	.0	9.5	.0	.0	.0	.0
17	3.6	6.7	46	11	7.5	18	11	.0	.0	.0	.0	.0
18	.0	6.7	9.1	21	6.3	19	.0	.0	.0	.0	.0	.0
19	3.6	13	37	21	7.8	17	.0	4.7	.0	8.1	.0	.0
20	.0	13	27	21	8.6	15	.0	.0	.0	.0	.0	.0
21	182	47	27	11	9.5	12	.0	.0	.0	.0	.0	.0
22	98	34	55	11	11	8.3	.0	2.6	.0	.2	.0	.0
23	210	20	56	5.4	10	5.4	.0	.0	2	6.5	.0	.0
24	12	14	85	5.4	10	3.3	.0	.0	6.7	8	.0	.0
25	29	14	135	76	10	2.3	.0	.0	.0	8	.0	.0
26	29	14	108	239	10	1.5	.0	.0	.0	8.1	.0	.0
27	12	85	40	108	9.8	1.1	.0	.0	1.7	.0	.0	.0
28	24	152	40	5	5.6	13	.0	7.8	.0	.0	.0	.0
29	24	....	60	5	3.1	7.3	.0	15	24	.0	.0	.0
30	22	....	97	15	3.3	7.3	.0	3.1	2.9	6.9	.0	.0
31	13	....	49	....	6.8	....	....	16	....	....	....	....
1911.												
1	14	.0	.0	20	20	10	.0	.0	20	43	9.3	22
2	15	7.8	7.8	16	20	.0	2.4	.0	9.3	33	34	11
3	52	.0	.0	9	10	.0	.0	.0	.0	33	.6	9.3
4	23	7.8	.0	18	10	.0	.0	.0	12	33	1.1	11
5	15	.0	7.8	27	10	10	.0	.0	.0	22	33	11
6	7.6	7.8	.0	119	10	42	.0	.0	7.8	11	22	.0
7	7.6	.0	.0	64	10	74	.0	.0	.0	22	30	11
8	.0	7.8	7.8	46	10	43	.0	.0	31	22	18	.0
9	7.6	.0	.0	28	10	33	.0	.0	51	11	14	11
10	7.6	.0	.0	28	10	11	.0	.0	31	11	.0	.0
11	.0	7.8	7.8	28	.0	.0	.0	.0	42	11	8.7	11
12	7.6	.0	.0	28	.0	43	.0	.0	22	.0	15	22
13	7.6	.0	7.8	28	10	43	.0	.0	11	11	15	.0
14	7.8	7.8	16	47	.0	33	.0	.0	11	.0	19	22
15	7.8	.0	31	48	10	11	.0	.0	11	11	41	11
16	7.8	.0	7.8	38	.0	11	.0	.0	.0	.0	30	43
17	.0	7.8	7.8	19	.0	.0	.0	.0	9.3	9.3	30	30
18	7.8	.0	7.8	20	.0	.0	.0	.0	11	146	63	33
19	.0	.0	7.8	20	40	11	.0	.0	.0	128	41	22
20	.0	7.8	7.8	20	30	.0	.0	.0	.0	75	41	40
21	.0	.0	7.8	39	20	.0	.0	.0	11	294	41	11
22	.0	.0	23	30	.0	.0	.0	.0	.0	281	30	55
23	1.8	.0	16	20	10	.0	.0	.0	.0	255	41	65
24	.0	7.8	16	20	.0	.0	.0	.0	11	198	19	17
25	.0	.0	16	20	10	11	.0	.0	.0	83	19	33
26	.0	7.8	25	20	10	.0	.0	.0	11	9.3	8.6	33
27	25	7.8	108	10	10	.0	.0	.0	.0	19	.0	22
28	7.8	7.8	51	20	10	.0	.0	.0	.0	9.3	7.9	11
29	7.8	....	121	10	.0	.0	.0	.0	11	9.3	8.6	22
30	.0	....	97	20	10	.0	.0	.0	11	19	13	33
31	7.8	....	36	....	.0	....	.0	24	....	.0	....	33

NOTE.—Daily discharge originally computed in terms of million gallons per 24 hours; converted into second-feet by engineers of the Survey.

Monthly discharge of Borden Brook near Blandford, Mass., for 1910–11.

[Drainage area, 7.95 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1910.					
January	210	0.0	24.8	3.12	3.60
February	152	.0	18.8	2.36	2.46
March	135	9.1	56	7.04	8.12
April	239	.0	25	3.14	3.50
May	22	3.1	11	1.38	1.59
June	32	1.1	15	1.89	2.11
July	18	.0	3.5	.440	.51
August	16	.0	1.9	.239	.28
September	25	.0	3.7	.465	.52
October	8.1	.0	1.7	.214	.25
November	43	.0	4.6	.579	.65
December	.0	.0	.0	.000	.00
The year	239	.0	13.8	1.74	23.59
1911.					
January	52	0.0	7.9	.994	1.15
February	7.8	.0	3.3	.415	.43
March	121	.0	21	2.64	3.04
April	119	9	29	3.65	4.07
May	40	.0	9.5	1.20	1.38
June	74	.0	13	1.64	1.83
July	2.4	.0	.08	.01	.01
August	24	.0	.80	.10	.10
September	51	.0	11	1.38	1.54
October	294	.0	58	7.30	8.42
November	63	.0	22	2.77	3.09
December	65	.0	20	2.52	2.91
The year	294	.0	16.3	2.05	27.91

NOTE.—Figures represent the natural flow of the stream, excepting that no correction is made for evaporation and seepage from the reservoir.

Discharge figures furnished by Mr. Lochridge, in million gallons per day; converted into second-feet by engineers of United States Geological Survey.

HOUSATONIC RIVER BASIN.

HOUSATONIC RIVER AT GAYLORDSVILLE, CONN.

Location.—At the covered wooden highway bridge at Gaylordsville, about 2 miles below the mouth of Tenmile River.

Records available.—October 24, 1900, to December 31, 1912.

Drainage area.—1,020 square miles.

Gage.—Chain attached to bridge; read once each day; datum unchanged.

Channel.—Conditions for obtaining accurate discharge data are good.

Discharge measurements.—Made from a cable 1¼ miles below the gage, as the cross section at the bridge is unfavorable for accurate measurements.

Artificial control.—Upstream, the nearest dam is at Bulls Bridge. Downstream, the nearest dam is at New Milford, about 7 miles below the station. At high stages backwater from the dam below may slightly affect the relation between gage height and discharge. Operation of power plants above the station causes a very marked diurnal fluctuation in the flow at this point. For this reason it is not advisable to attempt to estimate the daily discharge from daily gage heights, but the rate of flow corresponding to each gage reading is published. How near this rate approaches the mean for the day can not be stated at present.

Winter flow.—Affected by ice for short periods.

Accuracy.—A good discharge rating curve has been developed so that accuracy of records at this point depends entirely upon the accuracy of the gage heights.

Cooperation.—Gage heights from November to April, inclusive, are furnished by United States Weather Bureau.

Gage height, in feet, and discharge, in second-feet, of Housatonic River at Gaylordsville, Conn., for 1910–1912.

[G. H. Monroe, observer.]

Day.	January.		February.		March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1910.												
1	3.5	......	4.9	1,900	9.4	12,600	5.8	3,450	5.0	2,050	5.4	2,690
2	3.5	......	4.6	1,490	9.7	13,500	5.8	3,450	5.0	2,050	5.2	2,360
3	3.6	......	4.7	1,620	9.3	12,300	5.7	3,250	5.3	2,520	5.0	2,050
4	3.5	......	4.5	1,370	8.2	9,340	5.4	2,690	5.3	2,520	5.0	2,050
5	3.6	......	4.5	1,370	7.6	7,730	5.3	2,520	5.3	2,520	4.6	1,490
6	3.6	......	4.5	1,370	7.3	6,950	5.3	2,520	5.1	2,200	5.1	2,200
7	4.2	......	4.1	970	7.7	7,990	5.0	2,050	5.1	2,200	5.1	2,200
8	4.8	......	4.2	1,060	7.9	8,530	5.0	2,050	4.9	1,900	5.2	2,360
9	4.6	......	4.3	1,160	7.5	7,470	5.1	2,200	4.9	1,900	5.1	2,200
10	4.6	......	4.2	1,060	7.2	6,690	4.9	1,900	5.1	2,200	5.2	2,360
11	4.9	......	4.6	1,490	6.6	5,210	5.0	2,050	4.9	1,900	5.3	2,520
12	4.7	......	4.4	1,260	6.4	4,750	4.8	1,760	4.9	1,900	5.5	2,870
13	4.5	......	4.5	1,370	6.3	4,520	5.1	2,200	4.8	1,760	5.4	2,690
14	4.4	......	4.5	1,370	6.1	4,080	5.0	2,050	4.7	1,620	5.3	2,520
15	4.3	......	4.4	1,260	6.1	4,080	5.0	2,050	4.4	1,260	5.3	2,520
16	4.0	......	4.6	1,490	5.6	3,080	5.0	2,050	4.4	1,260	5.2	2,360
17	4.0	......	4.8	1,760	5.7	3,250	4.6	1,490	4.0	890	5.1	2,200
18	3.8	......	4.9	1,900	5.7	3,250	4.8	1,760	4.3	1,160	5.2	2,360
19	4.2	......	4.9	1,900	5.7	3,250	5.3	2,520	4.7	1,620	5.1	2,200
20	4.5	......	4.8	1,760	5.6	3,080	5.3	2,520	4.6	1,490	4.6	1,490
21	4.5	......	4.8	1,760	5.6	3,080	5.3	2,520	4.6	1,490	4.7	1,620
22	11.2	......	6.3	4,520	5.7	3,250	5.2	2,360	4.5	1,370	4.6	1,490
23	8.0	8,800	5.7	3,250	5.9	3,650	4.9	1,900	4.6	1,490	4.6	1,490
24	7.2	6,690	5.7	3,250	5.9	3,650	4.9	1,900	4.5	1,370	4.1	970
25	7.2	6,690	5.3	2,520	6.2	4,300	4.9	1,900	4.4	1,260	4.2	1,060
26	6.2	4,300	5.2	2,360	5.9	3,650	6.2	4,300	4.5	1,370	3.9	816
27	6.2	4,300	5.0	2,050	6.2	4,300	6.8	5,690	4.9	1,900	4.2	1,060
28	5.7	3,250	6.6	5,210	6.4	4,750	6.3	4,520	4.7	1,620	4.0	890
29	5.5	2,870	......	......	6.4	4,750	6.2	4,300	5.0	2,050	4.1	970
30	5.2	2,360	......	......	6.2	4,300	5.7	3,250	4.1	970	3.9	816
31	5.2	2,360	......	......	5.8	3,450	......	......	5.1	2,200	......	......

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge
1910.												
1	4.0	890	3.7	682	3.0	305	3.1	352	3.2	401	3.7	682
2	3.6	620	3.5	561	2.9	261	2.8	220	3.2	401	4.2	1,060
3	3.2	401	3.3	452	3.2	401	3.2	401	3.1	352	3.9	816
4	3.3	452	3.5	561	2.8	220	3.3	452	3.5	561	3.4	505
5	3.3	452	3.8	747	3.3	452	3.2	401	5.3	2,520	3.5	......
6	3.2	401	4.2	1,060	3.6	620	3.3	452	4.5	1,370	3.5	......
7	3.3	452	3.5	561	4.5	1,370	3.2	401	4.4	1,260	3.3	......
8	3.6	620	3.2	401	4.0	890	3.2	401	4.2	1,060	3.8	......
9	3.7	682	3.1	352	4.2	1,060	2.4	83	4.2	1,060	3.6	......
10	3.0	305	3.0	305	4.2	1,060	3.0	305	3.7	682	3.6	......
11	3.5	561	4.9	1,900	3.2	401	3.3	452	4.2	1,060	3.2	......
12	3.5	561	4.2	1,060	3.4	505	3.0	305	4.0	890	3.4	......
13	3.0	305	3.9	816	2.9	261	3.0	305	3.4	505	3.6	......
14	3.0	305	3.2	401	3.4	505	3.0	305	4.1	970	3.6	......
15	2.9	261	3.1	352	3.4	505	3.1	352	3.5	561	3.6	......
16	3.5	561	3.5	561	3.4	505	2.7	182	3.9	816	3.6	......
17	3.5	561	3.3	452	3.7	682	3.3	452	3.7	682	3.5	......
18	3.4	505	3.1	352	3.1	352	3.0	305	3.5	561	3.0	......
19	3.3	452	3.3	452	3.6	620	3.0	305	3.3	452	3.3	......
20	3.4	505	3.8	747	3.3	452	3.0	305	3.2	401	3.6	......
21	3.4	505	3.4	505	3.3	452	2.9	261	3.6	620	3.5	......
22	3.3	452	3.4	505	3.3	452	2.9	261	3.5	561	3.5	......
23	3.0	305	3.3	452	3.3	452	2.7	182	3.2	401	3.5	......
24	2.7	182	3.3	452	3.2	401	3.2	401	3.0	305	3.5	......
25	3.2	401	3.2	401	2.8	220	3.2	401	3.5	561	5.5	2,870
26	3.2	401	3.3	452	3.5	561	3.1	352	3.6	620	4.5	1,370
27	3.1	352	3.4	505	3.0	305	3.2	401	4.0	890	4.5	1,370
28	3.2	401	2.9	261	3.1	352	3.1	352	3.6	620	4.7	1,620
29	3.2	401	3.2	401	3.4	505	3.1	352	3.7	682	4.6	1,490
30	3.3	452	3.2	401	3.6	620	2.4	83	3.7	682	4.6	1,490
31	3.2	401	2.9	261	......	......	2.9	261	......	......	4.3	1,160

Gage height, in feet, and discharge, in second-feet, of Housatonic River at Gaylordsville, Conn., for 1910–1912—Continued.

Day.	January.		February.		March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1911.												
1	4.0	890	4.7	1,620	4.5	1,370	6.5	4,980	5.0	2,050	3.9	816
2	4.5	1,370	4.5	1,370	4.4	1,260	6.2	4,300	4.9	1,900	4.1	970
3	4.7	1,620	4.0	890	4.2	1,060	5.5	2,870	5.2	2,360	3.7	682
4	5.0	2,050	4.0	890	4.2	1,060	5.4	2,690	5.2	2,360	3.7	682
5	5.0	2,050	4.5	1,370	3.7	682	5.3	2,520	5.2	2,360	3.5	561
6	5.0	2,050	4.2	1,060	4.6	1,490	5.9	3,650	4.9	1,900	3.7	682
7	4.8	1,760	4.0	890	3.9	816	6.3	4,520	4.8	1,760	4.2	1,060
8	4.8	1,760	3.9	816	3.8	747	6.3	4,520	4.8	1,760	4.6	1,420
9	4.7	1,620	4.0	890	3.8	747	6.3	4,520	4.8	1,760	4.5	1,370
10	4.7	1,620	4.0	890	4.1	970	6.3	4,520	4.8	1,760	4.3	1,160
11	4.5	1,370	4.0	890	4.0	890	6.3	4,520	4.7	1,620	3.8	747
12	4.5	1,370	4.0	890	3.9	816	5.9	3,650	4.8	1,760	4.0	890
13	4.5	1,370	4.0	890	4.2	1,060	5.8	3,450	4.7	1,620	4.7	1,620
14	4.6	1,490	3.8	747	4.1	970	5.7	3,250	4.3	1,160	5.3	2,520
15	4.8	1,760	3.5	561	4.8	1,760	6.0	3,860	4.3	1,160	5.0	2,050
16	4.7	1,620	3.5	561	5.5	2,870	6.2	4,300	4.2	1,060	4.7	1,620
17	4.3	1,160	3.6	620	4.9	1,900	6.2	4,300	4.3	1,160	4.7	1,620
18	4.1	970	3.8	747	5.1	2,200	5.8	3,450	4.5	1,370	4.5	1,370
19	4.0	890	3.6	620	4.5	1,370	5.8	3,450	4.5	1,370	4.2	1,060
20	4.3	1,160	3.8	747	4.4	1,260	5.6	3,060	4.7	1,620	4.2	1,060
21	4.0	890	3.8	747	4.8	1,760	5.7	3,250	4.5	1,370	4.2	1,060
22	4.0	890	3.6	620	5.2	2,360	5.6	3,060	4.5	1,370	4.0	890
23	4.0	890	3.6	620	5.4	2,690	5.6	3,060	4.3	1,160	3.9	816
24	4.0	890	3.6	620	5.1	2,200	5.3	2,520	4.4	1,260	3.9	816
25	3.6	620	3.6	620	4.8	1,760	5.3	2,520	4.1	970	3.6	620
26	3.6	620	3.7	682	4.8	1,760	5.2	2,360	4.1	970	3.5	561
27	3.7	682	4.2	1,060	5.0	2,050	5.2	2,360	4.0	890	3.0	305
28	5.0	2,050	4.8	1,760	6.6	5,210	5.1	2,200	3.5	561	3.7	682
29	5.0	2,050	......	......	6.3	4,520	5.1	2,200	3.8	747	3.7	682
30	5.0	2,050	......	......	7.9	8,530	5.0	2,050	3.4	505	3.6	620
31	4.8	1,760	......	......	7.4	7,210	......	......	3.9	816	......	......

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1911.												
1	3.5	561	3.2	401	5.0	2,050	3.6	620	5.3	2,520	5.2	2,360
2	3.3	452	3.2	401	4.6	1,490	4.4	1,260	5.3	2,520	5.3	2,520
3	3.3	452	3.1	352	4.3	1,160	4.5	1,370	5.3	2,520	5.2	2,360
4	3.2	401	3.0	305	3.8	747	4.3	1,160	5.2	2,360	5.0	2,050
5	3.1	352	2.9	261	3.6	620	4.5	1,370	5.0	2,050	4.6	1,490
6	3.2	401	2.5	114	3.6	620	4.5	1,370	4.7	1,620	4.7	1,620
7	3.1	352	2.8	220	3.6	620	4.4	1,260	5.3	2,520	4.6	1,490
8	3.8	747	2.8	220	3.7	682	4.7	1,620	5.2	2,360	4.8	1,760
9	3.2	401	3.0	305	4.1	970	4.4	1,260	5.2	2,360	4.7	1,620
10	2.9	261	2.9	261	4.6	1,490	4.1	970	5.1	2,200	4.7	1,620
11	2.8	220	2.9	261	4.4	1,260	3.9	816	4.7	1,620	4.8	1,760
12	3.0	305	2.9	261	4.4	1,260	4.1	970	4.8	1,760	4.7	1,620
13	2.8	220	2.6	147	4.3	1,160	4.1	970	5.1	2,200	4.6	1,490
14	2.8	220	2.7	182	4.0	890	4.0	890	4.9	1,900	4.7	1,620
15	2.8	220	2.9	261	4.0	890	4.1	970	5.1	2,200	4.9	1,900
16	2.8	220	3.0	305	3.9	816	3.7	682	5.3	2,520	4.9	1,900
17	3.4	505	2.8	220	3.9	816	3.7	682	5.2	2,360	5.2	2,360
18	3.4	505	3.2	401	3.6	620	3.9	816	5.3	2,520	5.2	2,360
19	3.5	561	3.1	352	3.5	561	7.7	7,990	6.2	4,300	5.2	2,360
20	3.3	452	3.0	305	3.5	561	7.0	6,180	6.0	3,860	5.1	2,200
21	3.5	561	3.1	352	3.6	620	6.7	5,450	5.6	3,060	4.8	1,760
22	3.4	505	3.0	305	3.9	816	7.8	8,260	5.6	3,060	5.0	2,050
23	3.2	401	2.9	261	4.0	890	7.9	8,530	5.5	2,870	5.5	2,870
24	3.2	401	3.2	401	3.7	682	7.5	7,470	5.7	3,250	5.8	3,450
25	3.9	816	3.2	401	3.5	561	6.9	5,930	5.6	3,060	5.7	3,250
26	4.1	970	3.1	352	3.6	620	6.6	5,210	5.6	3,060	5.7	3,250
27	3.7	682	3.3	452	3.4	505	6.6	5,210	5.4	2,690	5.6	3,060
28	3.1	352	3.4	505	3.8	747	6.0	3,860	5.4	2,690	5.7	3,250
29	3.2	401	3.4	505	3.7	682	5.5	2,870	5.4	2,690	5.3	2,520
30	3.2	401	4.9	1,900	3.7	682	5.7	3,250	5.2	2,360	4.9	1,900
31	3.4	505	4.8	1,760	......	......	5.5	2,870	......	......	5.0	2,050

Gage height, in feet, and discharge, in second-feet, of Housatonic River at Gaylordsville, Conn., for 1910–1912—Continued.

Day.	January.		February.		March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1912.												
1	5.1	2,200	4.3	1,160	5.0	2,050	6.8	5,690	6.2	4,300	5.5	2,870
2	5.0	2,050	4.4	1,260	4.7	1,620	6.8	5,690	6.0	3,860	5.6	3,060
3	5.1	2,200	4.5	1,370	4.5	1,370	7.8	8,260	5.8	3,450	5.4	2,690
4	4.9	1,900	4.3	1,160	4.5	1,370	7.5	7,470	5.7	3,250	5.5	2,870
5	4.9	1,900	4.3	1,160	4.5	1,370	7.1	6,430	5.7	3,250	5.5	2,870
6	4.4	1,260	4.3	1,160	4.5	1,370	6.8	5,690	5.7	3,250	5.4	2,690
7	4.3	1,160	4.3	1,160	4.4	1,260	6.5	4,980	5.9	3,650	5.3	2,520
8	4.5	1,370	4.2	1,060	4.5	1,370	7.4	7,210	5.8	3,450	5.2	2,360
9	4.6	1,490	4.3	1,160	4.6	1,490	7.5	7,470	5.8	3,450	5.0	2,050
10	4.5	1,370	4.3	1,160	4.5	1,370	7.2	6,690	5.7	3,250	4.8	1,760
11	4.4	1,260	3.9	816	4.5	1,370	7.0	6,180	5.7	3,250	4.8	1,760
12	4.4	1,260	4.0	890	4.5	1,370	6.8	5,690	5.7	3,250	4.8	1,760
13	4.4	1,260	4.0	890	8.8	10,960	6.6	5,210	5.5	2,870	4.9	1,900
14	4.3	1,160	4.3	1,160	6.5	4,980	6.6	5,210	5.5	2,870	4.7	1,620
15	4.4	1,260	4.4	1,260	6.5	4,980	6.1	4,080	5.6	3,060	4.7	1,620
16	4.4	1,260	4.3	1,160	9.2	12,060	6.4	4,750	5.6	3,060	4.3	1,160
17	4.2	1,060	4.3	1,160	7.6	7,730	6.7	5,450	6.2	4,300	4.3	1,160
18	4.4	1,260	4.0	890	7.5	7,470	6.9	5,930	6.2	4,300	4.2	1,060
19	4.5	1,370	4.0	890	7.1	6,430	7.1	6,430	6.0	3,860	4.1	970
20	5.0	2,050	4.5	1,370	6.7	5,450	6.8	5,690	5.8	3,450	4.2	1,060
21	4.8	1,760	4.7	1,620	6.5	4,980	6.5	4,980	5.6	3,060	4.1	970
22	4.8	1,760	9.0	11,500	6.3	4,520	6.5	4,980	5.6	3,060	4.2	1,060
23	5.0	2,050	6.0	3,860	6.1	4,080	6.5	4,980	5.5	2,870	3.7	682
24	4.8	1,760	5.4	2,690	6.0	3,860	6.4	4,750	5.5	2,870	3.7	682
25	4.5	1,370	5.1	2,200	6.3	4,520	6.5	4,980	5.3	2,520	3.8	747
26	4.5	1,370	5.2	2,360	5.6	3,060	6.5	4,980	5.4	2,690	3.7	682
27	4.5	1,370	7.5	7,470	5.6	3,060	6.0	3,860	5.0	2,050	3.5	561
28	4.4	1,260	6.0	3,860	5.9	3,650	5.9	3,650	5.1	2,200	3.7	682
29	4.6	1,490	5.2	2,360	6.9	5,930	5.7	3,250	5.0	2,050	3.9	816
30	4.4	1,260	......	......	7.8	8,260	6.6	5,210	5.4	2,690	3.5	561
31	4.4	1,260	......	......	7.3	6,950	......	......	5.9	3,650	......	......

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1912.												
1	3.5	561	3.0	305	3.0	305	3.2	401	4.6	1,490	4.6	1,490
2	3.5	561	3.1	352	3.4	505	3.4	505	4.5	1,370	4.3	1,160
3	3.5	561	3.2	401	4.0	890	3.5	561	4.8	1,760	5.0	2,050
4	3.3	452	2.9	261	3.9	816	3.5	561	4.5	1,370	5.6	3,060
5	3.2	401	3.3	452	3.8	747	3.5	561	4.6	1,490	5.5	2,870
6	3.0	305	3.3	452	4.1	970	2.9	261	4.5	1,370	5.7	3,250
7	2.9	261	3.3	452	4.0	890	3.5	561	4.3	1,160	5.8	3,450
8	3.0	305	3.2	401	3.6	620	3.4	505	5.9	3,650	5.6	3,060
9	3.1	352	3.2	401	4.0	890	3.3	452	5.8	3,450	5.3	2,520
10	3.1	352	3.0	305	3.8	747	3.4	505	5.7	3,250	5.2	2,360
11	3.3	452	2.6	147	3.5	561	3.1	352	5.1	2,200	5.0	2,050
12	3.5	561	4.8	1,760	3.7	682	3.2	401	5.0	2,050	5.0	2,050
13	3.2	401	4.2	1,060	4.0	890	2.9	261	5.1	2,200	4.7	1,620
14	3.2	401	4.0	890	3.8	747	2.9	261	5.2	2,360	4.9	1,900
15	3.4	505	4.1	970	3.5	561	3.2	401	5.2	2,360	4.7	1,620
16	3.0	305	3.7	682	3.8	747	3.3	452	5.2	2,360	4.3	1,160
17	3.4	505	3.3	452	3.7	682	3.3	452	5.2	2,360	4.7	1,620
18	3.1	352	3.4	505	3.6	620	3.0	305	4.6	1,490	4.9	1,900
19	3.3	452	3.9	816	3.7	682	3.0	305	4.7	1,620	5.0	2,050
20	3.6	620	3.7	682	3.7	682	2.9	261	4.8	1,760	5.4	2,690
21	3.0	305	4.0	890	3.7	682	3.4	505	4.8	1,760	5.5	2,870
22	3.7	682	4.0	890	3.2	401	3.2	401	4.8	1,760	5.1	2,200
23	3.5	561	3.9	816	3.5	561	3.4	505	4.8	1,760	5.0	2,050
24	3.4	505	3.8	747	3.1	352	5.9	3,650	4.6	1,490	5.0	2,050
25	3.5	561	3.5	561	3.2	401	5.9	3,650	4.6	1,490	4.8	1,760
26	3.3	452	3.7	682	3.2	401	6.1	4,080	5.0	2,050	4.8	1,760
27	3.2	401	3.7	682	3.4	505	6.0	3,860	5.0	2,050	4.7	1,620
28	2.6	147	3.9	816	3.3	452	5.6	3,060	5.0	2,050	5.4	2,690
29	3.3	452	4.0	890	2.9	261	5.1	2,200	4.8	1,760	5.1	2,200
30	3.1	352	3.6	620	3.3	452	4.9	1,900	4.8	1,760	5.4	2,690
31	3.0	305	3.6	620	......	......	4.9	1,900	......	......	6.6	5,210

NOTE.—Gage read once daily at 8 a. m. Relation of gage height to discharge affected by ice Jan. 1 to about Jan. 21, and about Dec. 5–24, 1910. Probably little or no ice effect during 1911 or 1912. Discharge determined from a well-defined rating curve.

HUDSON RIVER BASIN.

COMPARATIVE DISCHARGE OF STREAMS IN THE HUDSON RIVER BASIN.

A comparison of discharge of streams in Hudson River basin, containing two tables for the years 1904 to 1911, inclusive, appears on pages 117–122 of Water-Supply Paper 301. The comparison is continued in the following tables:

Comparison (by monthly means) of discharge in the Hudson River drainage basin for 1912.

Month.	Hudson, North Creek.	Schroon, Riverbank.	North Creek+Riverbank.	Hudson, Thurman.	Sacandaga.		Thurman+Hadley.	Hudson.	
					Hope.	Hadley.		Corinth.	Mechanicville+Champlain Canal.[a]
January	800	720	1,520	1,700	600	1,070	2,770	3,320	4,760
February	1,060	349	1,409	1,500	300	655	2,155	2,540	3,400
March	818	364	1,182	1,300	900	2,130	3,430	4,860	10,000
April	5,850	3,840	9,690	9,880	4,980	9,110	18,990	23,400	27,600
May	3,800	2,130	5,930	6,370	2,190	3,710	10,080	11,900	13,090
June	1,140	885	2,025	2,230	489	975	3,205	3,480	5,730
July	681	148	829	894	110	213	1,107	1,210	1,500
August	911	192	1,103	1,160	90.7	191	1,351	1,420	1,460
September	892	245	1,137	1,220	259	571	1,791	1,810	2,680
October	1,270	391	1,661	1,800	746	1,570	3,370	4,010	7,120
November	1,830	1,150	2,980	3,000	1,420	2,700	5,700	7,390	10,990
December	1,220	800	2,020	2,100	1,220	2,360	4,460	4,490	8,640
The year	1,690	931	2,621	2,750	1,110	2,100	4,850	5,820	8,060

[a] Canal assumed in operation May to November, inclusive, and to be carrying 190 second-feet.

Comparison (by monthly ratios) of discharge in the Hudson River drainage basin for 1912.

	Ratio of North Creek+Riverbank to Thurman.	Ratio of Thurman+Hadley to Corinth.	Ratio of Thurman+Hadley to Mechanicville.	Ratio of Corinth to Mechanicville.
Drainage area ratio	0.86	0.95	0.58	0.61
January	.89	.83	.58	.70
February	.94	.85	.63	.75
March	.91	.71	.34	.49
April	.98	.81	.69	.85
May	.93	.85	.77	.91
June	.91	.92	.56	.61
July	.93	.92	.74	.81
August	.95	.95	.93	.97
September	.93	.99	.67	.68
October	.92	.84	.47	.56
November	.99	.77	.52	.67
December	.96	.99	.52	.52
The year	.95	.83	.60	.72

HUDSON RIVER AT NORTH CREEK, N. Y.

Location.—At the highway bridge in the village of North Creek, immediately above the mouth of North Creek, which enters the Hudson from the right.

Records available.—September 21, 1907, to December 31, 1912. Data also in annual reports of the State Water Supply Commission and the State engineer and surveyor, and in the 1911 report of the State of New York Conservation Commission.

Drainage area.—804 square miles.

Gage.—Chain, read twice daily; datum, unchanged.

Channel.—Heavy gravel; considered fairly permanent.

Discharge measurements.—Made from the two-span steel highway bridge.

Artificial control.—The numerous lakes and ponds in the basin of the upper Hudson have a decided effect on the low-water flow; especially is this true of Indian Lake.[1] The use of these storage reservoirs in the spring in connection with log driving tends to vitiate the daily records at this station. Where possible, allowance is made for the effect of logging operations.

Winter flow.—Winters are severe in the northern part of the State and determinations of flow for the winter months are approximate because of ice.

Accuracy.—Discharge rating curve very well defined. Determinations of discharge for open-water periods considered excellent.

Discharge measurements of Hudson River at North Creek, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 19[a]	Frank Weber	4.60	883	Mar. 14[a]	Frank Weber	5.03	821
Feb. 8[a]	.....do	4.89	1,090	23[a]	.....do	4.74	773
29[a]	.....do	5.26	989	June 22	G. H. Canfield	2.52	466

[a] Measurement made under complete ice cover.

Daily gage height, in feet, of Hudson River at North Creek, N. Y., for 1912.

[Gilbert Dean, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.1	......	......	......	4.8	4.9	2.65	2.7	3.0	2.9	3.3	2.8
2	3.0	......	......	......	4.5	4.6	2.65	2.7	3.1	3.1	3.45	2.8
3	2.95	......	......	5.6	3.6	4.2	2.6	2.9	3.1	3.05	3.45	3.5
4	2.9	......	......	......	3.85	4.0	2.6	3.0	3.2	2.95	3.35	3.95
5	2.85	......	......	......	4.7	3.85	2.65	3.05	3.2	2.8	3.25	3.85
6	3.95	......	5.2	5.6	4.1	3.65	2.65	3.05	3.2	2.75	3.15	3.8
7	......	4.8	......	6.0	4.4	3.55	2.65	3.0	3.2	2.7	3.1	4.0
8	......	4.9	......	6.7	3.65	3.40	2.6	3.0	3.3	2.65	4.7	4.0
9	......	......	......	6.4	4.3	3.1	2.95	3.0	3.2	2.75	5.4	3.7
10	4.4	......	......	5.8	3.85	3.25	3.05	3.0	3.1	2.9	5.1	3.55
11	......	......	......	5.2	4.3	3.1	2.85	3.0	3.0	2.95	4.7	3.45
12	......	......	......	4.8	3.8	3.15	2.8	3.05	2.95	3.1	4.3	3.3
13	......	......	4.8	4.6	4.6	3.05	2.8	3.05	2.95	3.3	4.0	3.1
14	......	4.8	5.0	4.7	5.6	2.95	2.85	3.15	2.9	3.6	3.95	3.05
15	......	......	......	4.9	4.6	2.75	2.85	3.1	2.9	3.7	4.1	3.0
16	......	......	......	6.7	5.4	2.75	2.8	3.1	3.0	3.55	4.1	3.0
17	3.8	......	......	8.2	6.0	2.75	2.75	3.05	3.05	3.25	3.95	2.9
18	......	......	......	8.0	5.0	2.75	2.75	3.0	3.05	3.0	3.75	2.85
19	4.60	......	......	7.7	4.9	2.7	2.75	3.0	3.15	2.9	3.55	3.0
20	......	......	5.0	7.0	4.7	2.6	2.75	3.0	2.8	2.8	3.6	3.4
21	......	4.8	......	6.4	5.7	2.6	2.75	3.0	2.7	2.75	3.7	3.45
22	......	......	......	6.3	6.6	2.55	2.95	3.05	2.9	2.65	3.5	3.4
23	......	......	4.7	7.1	6.2	2.5	2.95	3.05	2.85	2.65	3.3	3.3
24	4.3	......	......	6.8	6.0	2.75	2.95	3.05	2.8	3.1	3.2	3.15
25	......	......	......	6.1	5.5	2.75	2.9	3.05	2.8	4.6	3.2	3.1
26	......	......	......	5.3	4.9	2.75	2.8	3.0	2.95	4.7	3.1	3.0
27	......	......	4.4	5.2	4.6	2.75	2.8	3.05	3.05	4.5	3.0	2.95
28	......	......	......	5.2	4.3	2.65	2.75	3.15	2.95	4.2	3.0	2.9
29	......	5.3	......	5.4	4.2	2.7	2.75	3.15	2.8	3.9	2.9	2.85
30	......	......	......	4.6	4.8	2.65	2.75	3.1	2.75	3.6	2.8	2.9
31	4.5	......	......	......	5.1	......	2.7	3.05	......	3.45	......	2.9

NOTE.—Relation of gage height to discharge affected by ice Jan. 6 to Apr. 5.

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[1] See Indian Lake at Indian Lake, N. Y., p. 144.

Daily discharge, in second-feet, of Hudson River at North Creek, N. Y., for 1912.

Day.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	990	....	3,680	3,880	570	610	890	790	1,220	700
2	890	....	3,100	3,290	570	610	990	990	1,420	700
3	840	....	1,620	2,570	530	790	990	940	1,420	1,480
4	790	....	2,000	2,240	530	890	1,100	840	1,280	2,160
5	745	....	3,480	2,000	570	940	1,100	700	1,160	2,000
6	....	5,440	2,400	1,700	570	940	1,100	655	1,040	1,920
7	....	6,430	2,920	1,550	570	890	1,100	610	990	2,240
8	....	8,330	1,700	1,350	530	890	1,220	570	3,480	2,240
9	....	7,490	2,740	990	840	890	1,100	655	4,970	1,770
10	....	5,930	2,000	1,160	940	890	990	790	4,300	1,550
11	....	4,520	2,740	990	745	890	890	840	3,480	1,420
12	....	3,680	1,920	1,040	700	940	840	990	2,740	1,220
13	....	3,290	3,290	940	700	940	840	1,220	2,240	990
14	....	3,480	5,440	840	745	1,040	790	1,620	2,160	940
15	....	3,880	3,290	655	745	990	790	1,770	2,400	890
16	....	8,330	4,970	655	700	990	890	1,550	2,400	890
17	....	12,900	6,430	655	655	940	940	1,160	2,160	790
18	....	12,300	4,090	655	655	890	940	890	1,840	745
19	....	11,300	3,880	610	655	890	1,040	790	1,550	890
20	....	9,200	3,480	530	655	890	700	700	1,620	1,350
21	....	7,490	5,680	530	655	890	610	655	1,770	1,420
22	....	7,220	8,050	495	840	940	790	570	1,480	1,350
23	....	9,490	6,950	460	840	940	745	570	1,220	1,220
24	....	8,620	6,430	655	840	940	700	990	1,100	1,040
25	....	6,690	5,200	655	790	940	700	3,290	1,100	990
26	....	4,740	3,880	655	700	890	840	3,480	990	890
27	....	4,520	3,290	655	700	940	940	3,100	890	840
28	....	4,520	2,740	570	655	1,040	840	2,570	890	790
29	....	4,970	2,570	610	655	1,040	700	2,080	790	745
30	....	3,290	3,680	570	655	960	655	1,620	700	790
31	....	....	4,300	....	610	940	....	1,420	....	790

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Hudson River at North Creek, N. Y., for 1912.

[Drainage area, 804 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	800	0.995	1.15	B.
February	....	....	1,060	1.32	1.42	B.
March	....	....	818	1.02	1.18	B.
April	12,900	800	5,850	7.28	8.12	A.
May	8,050	1,620	3,800	4.73	5.45	A.
June	3,880	460	1,140	1.42	1.58	A.
July	940	530	681	.847	.98	A.
August	1,040	610	911	1.13	1.30	A.
September	1,220	610	892	1.11	1.24	A.
October	3,480	570	1,270	1.58	1.82	A.
November	4,970	700	1,830	2.28	2.54	A.
December	2,240	700	1,220	1.52	1.75	A.
The year	12,900	....	1,690	2.10	28.53	

NOTE.—Discharge Jan. 6 to Apr. 5 estimated by means of 5 measurements made with ice present, climatologic records, consideration of storage, and comparison of the discharge with that at other stations.
Mean discharge Jan. 6 to 31 estimated 790 second-feet.
Mean discharge Apr. 1 to 5 estimated 1,540 second-feet.

HUDSON RIVER AT THURMAN, N. Y.

Location.—At the Delaware & Hudson Railroad bridge leading from Thurman to Warrensburg, about 950 feet below the highway bridge to Warrensburg, about 2,000 feet below the mouth of Schroon River, and about 13 miles above the mouth of Sacandaga River, which enters from the right.

Records available.—September 1, 1907, to December 31, 1912; data also in annual reports of the New York State Water Supply Commission, the State engineer and surveyor, and the State Conservation Commission of New York.

Drainage area.—1,550 square miles.

Gage.—Chain; read three times daily; datum unchanged.

Channel.—Sand and gravel; liable to shift.

Discharge measurements.—Made from the bridge.

Artificial control.—The influence of storage at Indian Lake and of mill control on Schroon River is observable at this station.

Winter flow.—Winter flow estimated from the determinations of combined flow at Riverbank and North Creek plus an estimated inflow between the two stations.

Accuracy.—Accuracy of the determinations to some extent impaired as the result of accumulations of logs at the control point below the section and also around the piers of the bridge. Discharge rating curve very well defined, and determinations of flow during the open-water season are considered fairly accurate.

Cooperation.—Gage heights, January to March and December, furnished by Albany office of United States Weather Bureau.

Discharge measurements of Hudson River at Thurman, N. Y., 1912.

Date.	Hydrographer.	Gage height.	Discharge.
1912.		*Feet.*	*Sec.-ft.*
June 21	G. H. Canfield	2.87	1,190
28	....do	2.80	1,110
July 4	....do	2.32	616
Aug. 1	J. G. Mathers	2.54	796

Daily gage height, in feet, of Hudson River at Thurman, N. Y., for 1912.

[S. H. Spencer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.8	5.4	5.2	5.8	5.2	4.8	2.7	2.5	2.65	2.85	3.4	3.1
2	6.2	5.4	5.1	5.6	4.9	4.6	2.48	2.46	2.95	3.05	3.4	3.0
3	6.5	5.5	5.1	5.4	4.7	4.4	2.46	2.55	3.0	2.95	3.4	3.7
4	6.5	5.6	5.1	5.1	3.85	4.1	2.34	2.6	3.1	2.85	3.4	3.9
5	6.2	5.6	5.2	5.0	5.0	4.0	2.55	2.9	2.95	2.8	3.3	3.9
6	5.5	5.4	5.1	5.4	3.85	3.8	2.47	2.8	2.95	2.38	3.2	3.8
7	5.4	5.4	5.2	6.7	4.7	3.75	2.31	2.8	3.0	2.8	3.2	4.0
8	5.9	5.3	5.2	6.7	3.85	3.6	2.65	2.85	2.85	2.7	4.6	4.0
9	6.0	5.3	5.1	6.7	4.2	3.05	2.50	2.85	3.0	2.75	5.0	3.7
10	6.2	5.3	5.1	6.4	4.2	3.35	3.0	2.95	2.95	2.85	4.8	3.6
11	5.8	5.3	5.1	6.0	4.0	3.25	2.7	2.65	2.85	3.0	4.5	3.5
12	5.5	5.4	5.1	5.6	4.1	3.35	2.65	2.95	2.8	2.95	4.2	3.4
13	5.3	5.3	5.2	5.4	4.8	3.15	2.55	3.0	2.8	2.85	4.1	3.3
14	5.3	5.3	5.2	5.4	5.3	3.15	2.50	3.0	2.75	3.4	4.0	3.2
15	5.4	5.1	5.1	5.5	5.0	2.95	2.8	2.9	2.55	3.5	4.2	3.1
16	5.3	5.1	5.2	6.7	5.1	2.7	2.7	2.9	3.05	3.35	4.2	3.1
17	5.4	5.1	5.3	7.9	4.8	3.0	2.65	2.8	3.05	3.2	4.1	3.0
18	5.8	5.1	5.4	8.0	4.7	3.0	2.6	2.65	3.0	2.85	4.0	3.0
19	5.8	5.0	5.3	7.9	4.7	3.0	2.55	2.85	3.1	2.75	3.8	3.2
20	5.6	5.0	5.5	7.4	4.6	2.95	2.55	2.8	2.95	2.6	3.65	3.3
21	5.4	5.0	5.3	6.8	5.2	2.85	2.50	2.85	2.75	2.8	3.7	3.5
22	5.4	5.2	5.1	6.6	6.2	2.8	2.8	2.9	2.50	2.65	3.6	3.4
23	5.3	5.2	4.9	7.5	6.0	2.32	2.75	2.9	3.0	2.75	3.45	3.4
24	5.3	5.3	4.9	7.0	5.7	2.95	2.75	2.9	2.8	3.4	3.35	3.2
25	5.3	5.2	4.6	6.6	5.6	3.0	2.65	2.65	2.8	4.3	3.4	3.0
26	5.3	5.2	4.6	5.9	5.1	2.85	2.6	3.0	2.8	4.3	3.3	3.0
27	5.5	5.2	4.5	6.2	4.9	2.8	2.6	2.95	2.9	4.2	3.2	3.0
28	5.3	5.3	4.6	5.7	4.6	2.85	2.6	3.0	2.9	3.95	3.1	3.1
29	5.7	5.2	4.6	5.8	4.4	2.8	2.7	2.95	2.46	3.75	3.0	3.1
30	5.5	....	4.7	5.2	4.8	2.38	2.6	2.95	2.9	3.5	3.1	3.1
31	5.5	....	5.3	....	5.0	.....	2.55	2.8	....	3.45	....	3.2

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 5. A log jam formed June 17 and caused some backwater at the gage for the remainder of the year. There were other log jams before June 17, but apparently they did not affect the gage heights.

Daily discharge, in second-feet, of Hudson River at Thurman, N. Y., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	7,520	6,320	990	770	935	1,180	2,150	1,560
2	....	6,620	5,730	752	734	1,320	1,470	2,150	1,390
3	....	6,020	5,150	734	825	1,390	1,320	2,150	2,840
4	....	3,610	4,290	632	880	1,560	1,180	2,150	3,330
5	....	6,920	4,010	825	1,240	1,320	1,110	1,940	3,330
6	8,120	3,610	3,480	743	1,110	1,320	664	1,740	3,080
7	12,000	6,020	3,360	608	1,110	1,390	1,110	1,740	3,590
8	12,000	3,610	2,990	935	1,180	1,180	990	5,290	3,590
9	12,000	4,570	1,760	770	1,180	1,390	1,050	6,470	2,840
10	11,100	4,570	2,400	1,390	1,320	1,320	1,180	5,870	2,600
11	9,920	4,010	2,180	990	935	1,180	1,390	5,000	2,370
12	8,720	4,290	2,400	935	1,320	1,110	1,320	4,140	2,150
13	8,120	6,320	1,960	825	1,390	1,110	1,180	3,860	1,940
14	8,120	7,820	1,960	770	1,390	1,050	2,150	3,590	1,740
15	8,420	6,920	1,560	1,110	1,240	825	2,370	4,140	1,560
16	12,000	7,220	1,140	990	1,240	1,480	2,040	4,140	1,560
17	15,600	6,320	1,390	935	1,110	1,480	1,740	3,860	1,390
18	15,900	6,020	1,390	880	935	1,390	1,180	3,590	1,390
19	15,600	6,020	1,390	825	1,180	1,560	1,050	3,080	1,740
20	14,100	5,730	1,320	825	1,110	1,320	880	2,720	1,940
21	12,300	7,520	1,180	770	1,180	1,050	1,110	2,840	2,370
22	11,700	10,500	1,110	1,110	1,240	770	940	2,600	2,150
23	14,400	9,920	616	1,050	1,240	1,390	1,050	2,260	2,150
24	12,900	9,020	1,320	1,050	1,240	1,110	2,150	2,040	1,740
25	11,700	8,720	1,390	935	935	1,110	4,420	2,150	1,390
26	9,620	7,220	1,180	880	1,390	1,110	4,420	1,940	1,390
27	10,500	6,620	1,110	880	1,320	1,240	4,140	1,740	1,390
28	9,020	5,730	1,180	880	1,390	1,240	3,460	1,560	1,560
29	9,320	5,150	1,110	990	1,320	734	2,960	1,390	1,560
30	7,520	6,320	664	880	1,320	1,240	2,370	1,560	1,560
31	....	6,920	....	825	1,110	....	2,260	....	1,740

NOTE.—Daily discharge determined from two fairly well defined rating curves, one applicable Apr. 6 to June 16, and the other June 17 to Dec. 31, the latter based on measurements made during the existence of a log jam.

Monthly discharge of Hudson River at Thurman, N. Y., for 1912.

[Drainage area, 1,550 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	1,700	1.10	1.27	C.
February	....	....	1,500	.968	1.04	C.
March	....	....	1,300	.839	.97	C.
April	15,900	1,650	9,880	6.37	7.11	B.
May	10,500	3,610	6,370	4.11	4.74	B.
June	6,320	616	2,230	1.44	1.61	B.
July	1,390	608	894	.577	.67	B.
August	1,390	734	1,160	.748	.86	B.
September	1,560	770	1,220	.787	.88	B.
October	4,420	664	1,800	1.16	1.34	B.
November	6,470	1,390	3,000	1.94	2.16	B.
December	3,590	1,390	2,100	1.35	1.56	B.
The year	15,900	608	2,750	1.77	24.21	

NOTE.—Discharge Jan. 1 to Apr. 5 estimated from the combined discharge of Schroon River and Hudson River at North Creek, considering the probable inflow between North Creek and Thurman.
Mean discharge Apr. 1 to 5 estimated 3,110 second-feet.

HUDSON RIVER AT CORINTH, N. Y.

Location.—One-half mile upstream from highway bridge crossing the Hudson at Corinth and one-half mile north of the Corinth post office, at the mouth of the second brook, upstream, tributary to the Hudson from the right; 5 miles by river below the village of Luzerne and 1½ miles above the dam of the International Paper Co. at Palmer Falls.

Records available.—June 1, 1904, to December 31, 1912.

Drainage area.—2,760 square miles.[1]

Gage.—Vertical staff bolted to the left-hand abutment on the downstream side of the highway bridge over the brook. The gage is about 25 feet from low-water line in Hudson River, but as there is practically no slope to the tributary stream low-water readings can be considered fair. The zero of the gage, unchanged since established, is at the same elevation as the crest of the Palmer Falls dams, which is assumed as 100 feet.

Channel.—Permanent; composed of coarse gravel and bowlders; fairly straight for upward of 2 miles above the gage, and current sluggish. The river begins to bend to the left almost at the gage and in the next 1,000 feet turns nearly 90°, then flows straight for 200 or 300 feet to the head of a rocky reef, which is practically a control for the gage. In the 1,000 feet between the point of control and the three-span steel highway bridge that crosses the Hudson at this point the river falls 3 or 4 feet.

Discharge measurements.—At low and medium stages made from a boat or by wading just above the point of control and about 1,100 feet downstream from the gage; at high stages from the upstream side of the highway bridge. None made during 1912.

Winter flow.—Ice forms in the river to a thickness of 2 or 3 feet in the vicinity of the gage and down to within 500 feet of the control. In a section at the control, however, the river is usually open and it is believed that there is no very marked effect from ice.

Artificial control.—The low-water flow is modified by release of stored water from Indian Lake and to some extent by release of water from other small ponds on the upper Hudson. The only dam on the main stream above the station is that which furnishes power to a paper mill at Luzerne, 5 miles above. Below the bridge and on the left-hand side of the stream is a low dam built in November, 1905, by the Corinth Electric Power Co., to divert water to a small electric plant which furnishes light and power for the villages of Corinth and Palmer Falls. In September, 1909, a temporary brush dam was built at this point by the same company. The dam of the International Paper Co. is about one-half mile farther downstream. Neither dam affects the records at the gage.

Point of zero flow.—Soundings near the point of control indicate that there would be no flow past the gage if the water fell below 123 feet on the gage.

Accuracy.—Conditions are not entirely favorable for accurate determination of flow. During the greater part of the time log jams rest against the two bridge piers and often extend upstream above the point of control, causing back water at the gage. Construction work on the temporary brush dam in the fall of 1909 may have produced a slight effect at the gage. The discharge curve has been developed from measurements made by engineers of the United States Geological Survey and probably represents the discharge at the station fairly well for conditions unaffected by log jams or ice.

Cooperation.—Gage installed and gage heights furnished by the International Paper Co.

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[1] The figure formerly published was 2,728 square miles, but the new figure is probably more nearly correct.

Daily gage height, in feet, of Hudson River at Corinth, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	127.4	126.15	126.1	129.2	129.0	128.4	125.45	125.4	125.55	125.85	126.9	126.2
2	127.2	126.2	126.1	129.4	128.8	128.0	125.4	125.4	125.5	125.9	126.85	126.25
3	126.95	126.3	126.05	129.3	128.2	127.8	125.4	125.4	125.6	125.95	126.95	127.7
4	126.85	126.25	126.1	129.2	127.9	127.5	125.4	125.45	125.8	125.9	126.8	127.4
5	126.7	126.25	126.05	129.3	128.5	127.3	125.4	125.55	125.8	125.75	126.65	127.4
6	126.55	126.25	126.05	130.0	127.9	127.1	125.4	125.55	125.8	125.65	126.5	127.3
7	126.3	126.2	126.05	131.4	128.2	126.9	125.4	125.55	125.75	125.6	126.5	127.4
8	126.35	126.25	126.0	132.7	127.8	126.75	125.4	125.7	125.7	125.65	128.8	127.4
9	126.6	126.15	126.05	132.5	128.1	126.5	125.4	125.55	125.75	125.6	129.7	127.1
10	126.65	126.15	126.0	131.8	127.7	126.35	125.6	125.6	125.7	125.6	129.7	127.7
11	126.45	126.1	126.05	131.1	127.6	126.4	125.55	125.65	125.65	125.7	129.2	127.5
12	126.2	126.1	126.05	130.3	127.3	126.3	125.45	125.65	125.6	125.75	128.8	127.2
13	126.2	126.1	126.05	129.9	127.7	126.25	125.4	125.65	125.6	125.9	128.3	126.6
14	126.1	126.05	126.1	129.7	128.2	126.2	125.5	125.65	125.55	126.0	128.1	126.6
15	126.05	126.05	126.15	129.8	128.2	126.0	125.55	125.65	125.55	126.2	128.2	126.5
16	126.05	126.05	126.95	130.7	128.4	125.9	125.55	125.65	125.8	126.2	128.1	126.55
17	126.0	126.0	127.3	132.3	128.5	125.85	125.5	125.65	125.95	126.1	127.9	126.4
18	126.0	126.0	127.5	132.9	128.9	125.95	125.45	125.55	125.9	125.9	127.7	126.35
19	126.4	126.0	127.7	133.1	128.7	125.95	125.45	125.6	126.0	125.8	127.4	126.6
20	126.45	126.05	127.9	132.8	128.5	125.9	125.4	125.55	126.1	125.75	127.2	126.1
21	126.35	126.0	127.9	132.0	129.1	125.8	125.45	125.55	125.9	125.8	127.1	126.2
22	126.35	126.05	127.7	131.5	130.1	125.75	125.55	125.6	125.75	125.85	127.0	126.45
23	126.35	126.1	127.5	131.8	130.2	125.6	125.6	125.6	125.7	125.9	126.85	126.95
24	126.25	126.15	127.4	132.1	129.8	125.55	125.6	125.65	125.75	127.2	126.65	126.55
25	126.2	126.2	127.3	131.5	129.8	125.75	125.55	125.6	125.8	128.6	126.8	126.35
26	126.15	126.2	127.0	130.8	129.2	125.75	125.5	125.6	126.1	129.1	126.7	126.3
27	126.15	126.2	126.9	130.1	128.9	125.7	125.4	125.65	126.2	128.9	126.65	126.3
28	126.15	126.15	126.75	130.2	128.4	125.65	125.4	125.6	126.1	128.5	126.55	126.3
29	126.2	126.1	127.1	129.9	128.1	125.6	125.4	125.7	125.9	128.0	126.35	126.25
30	126.2	....	128.1	129.7	128.3	125.5	125.4	125.65	125.8	127.6	126.3	126.3
31	126.15	....	128.4	....	128.6	....	125.4	125.6	....	127.2	....	126.6

NOTE.—Gage heights probably affected by backwater at high stages from the dam which is being constructed below the station. This effect is more marked during the last months of the year.

Daily discharge, in second-feet, of Hudson River at Corinth, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,860	2,580	2,460	14,900	14,000	11,200	1,190	1,110	1,360	1,910	4,950	2,710
2	6,070	2,710	2,460	15,900	13,000	9,410	1,110	1,110	1,270	2,010	4,770	2,840
3	5,140	2,980	2,340	15,400	10,300	8,530	1,110	1,110	1,440	2,120	5,140	8,100
4	4,770	2,840	2,460	14,900	8,970	7,270	1,110	1,190	1,810	2,020	4,590	6,860
5	4,240	2,840	2,340	15,400	11,700	6,460	1,110	1,360	1,810	1,720	4,070	6,860
6	3,740	2,840	2,340	18,800	8,970	5,690	1,110	1,360	1,810	1,530	3,580	6,460
7	2,980	2,710	2,340	25,900	10,300	4,950	1,110	1,360	1,720	1,440	3,580	6,860
8	3,120	2,840	2,230	32,700	8,530	4,420	1,110	1,620	1,620	1,530	13,000	6,860
9	3,900	2,580	2,340	31,600	9,850	3,580	1,110	1,360	1,720	1,440	18,300	5,690
10	4,170	2,580	2,230	28,000	8,100	3,120	1,440	1,440	1,620	1,440	18,300	8,100
11	3,420	2,460	2,340	24,300	7,680	3,270	1,360	1,530	1,530	1,620	14,900	7,270
12	2,710	2,460	2,340	20,300	6,460	2,980	1,190	1,530	1,440	1,720	13,000	6,070
13	2,710	2,460	2,340	18,300	8,100	2,840	1,110	1,530	1,440	2,010	10,800	3,900
14	2,460	2,340	2,460	17,300	10,300	2,710	1,270	1,530	1,360	2,230	9,850	3,900
15	2,340	2,340	2,580	17,800	10,300	2,230	1,360	1,530	1,360	2,710	10,300	3,580
16	2,340	2,340	5,140	22,300	11,200	2,010	1,360	1,530	1,810	2,710	9,850	3,740
17	2,230	2,230	6,460	30,600	11,700	1,910	1,270	1,530	2,120	2,460	8,970	3,270
18	2,230	2,230	7,270	33,800	13,500	2,120	1,190	1,360	2,010	2,010	8,100	3,120
19	3,270	2,230	8,100	34,800	12,600	2,120	1,190	1,440	2,230	1,810	6,860	3,900
20	3,420	2,340	8,970	33,200	11,700	2,010	1,110	1,360	2,460	1,720	6,070	2,460
21	3,120	2,230	8,970	29,000	14,400	1,810	1,190	1,360	2,010	1,810	5,690	2,710
22	3,120	2,340	8,100	26,400	19,300	1,720	1,360	1,440	1,720	1,910	5,320	3,420
23	3,120	2,460	7,270	28,000	19,800	1,440	1,440	1,440	1,620	2,010	4,770	5,140
24	2,840	2,580	6,860	29,500	17,800	1,360	1,440	1,530	1,720	6,070	4,070	3,740
25	2,710	2,710	6,460	26,400	17,800	1,720	1,360	1,440	1,810	12,100	4,590	3,120
26	2,580	2,710	5,320	22,800	14,900	1,720	1,270	1,440	2,460	14,000	4,240	2,980
27	2,580	2,710	4,950	19,300	13,500	1,620	1,110	1,530	2,710	13,500	4,070	2,980
28	2,580	2,580	4,420	19,800	11,200	1,530	1,110	1,440	2,460	11,700	3,740	2,980
29	2,710	2,460	5,690	18,300	9,850	1,440	1,110	1,620	2,010	9,410	3,120	2,840
30	2,710	....	9,850	17,300	10,800	1,270	1,110	1,530	1,810	7,680	2,980	2,980
31	2,580	....	11,200	....	12,100	....	1,110	1,440	....	6,070	....	3,900

Monthly discharge of Hudson River at Corinth, N. Y., for 1912.

[Drainage area, 2,760 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	6,860	2,230	3,320	1.21	1.40	B.
February	2,980	2,230	2,540	.921	.99	B.
March	11,200	2,230	4,860	1.76	2.03	B.
April	34,800	14,900	23,400	8.48	9.46	B.
May	19,800	6,460	11,900	4.31	4.97	B.
June	11,200	1,270	3,480	1.26	1.41	B.
July	1,440	1,110	1,210	.438	.50	C.
August	1,620	1,110	1,420	.514	.59	C.
September	2,710	1,270	1,810	.656	.73	B.
October	14,000	1,440	4,010	1.45	1.67	B.
November	18,300	2,980	7,390	2.68	2.99	B.
December	8,100	2,460	4,490	1.63	1.88	B.
The year	34,800	1,110	5,820	2.11	28.62	

HUDSON RIVER AT SPIER FALLS, N. Y.

Location.—On the river road, half a mile below the Spier Falls dam, about 11½ miles below the mouth of Sacandaga River. This station is most easily accessible from Glens Falls, N. Y., a distance of 11 miles. (See Pl. III, *B*.)

Records available.—October 6 to December 31, 1912.

Drainage area.—2,800 square miles (from United States Geological Survey topographic sheets).

Gage.—Recording hydrograph and auxiliary sloping staff gage. The automatic gage is in a brick shelter 5 feet square inside dimensions. Underneath the shelter is a brick well 3½ feet square, 21 feet deep. This well is connected with the river by a 4-inch cast-iron water pipe 78 feet long. A shear gate valve is set at the inner end of the pipe for use in cleaning the well when necessary. The outer end is fastened firmly in a concrete anchorage and is submerged at all stages. Inside the well is a hook gage used for setting the automatic gage. The sloping staff gage is mounted on small concrete piers 10 feet upstream from the shelter.

Channel.—Coarse gravel and bowlders.

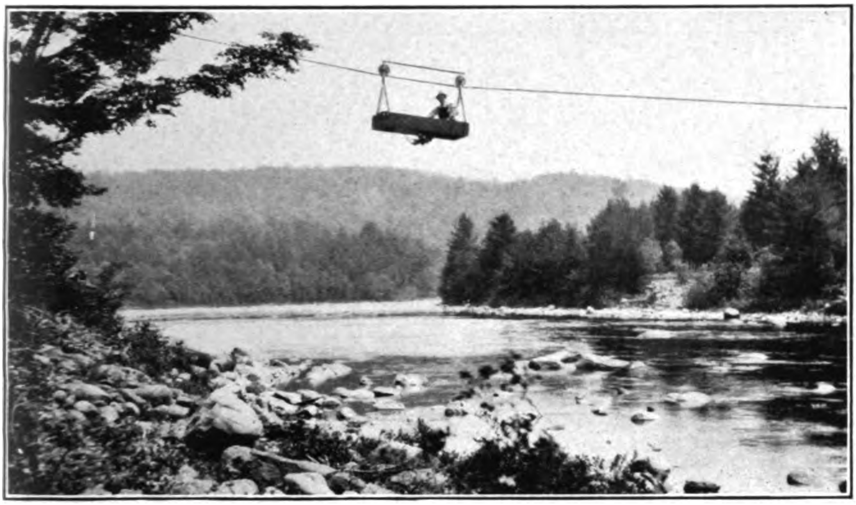
Discharge measurements.—Made from a cable and car located about 1,000 feet downstream from the automatic gage. The cable is of 450 feet span, supported on the left bank by a pulley hung from a frame about 4 feet high; on the right bank by a pulley hung from a frame about 20 feet high.

Winter flow.—Ice prevails during extremely cold weather. It is not known how much this will affect the relation between gage height and discharge. Efforts will be made to obtain frequent discharge measurements.

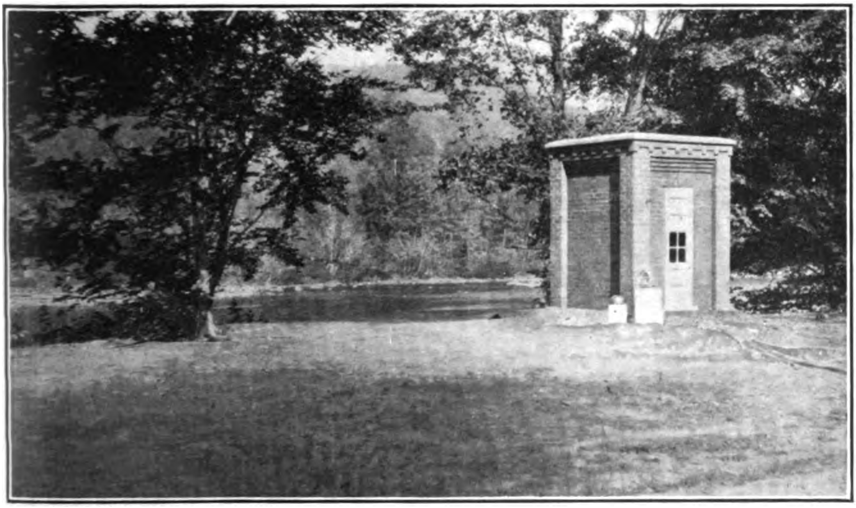
Artificial control.—Control at the Spier Falls dam is indicated by the hydrograph.

Accuracy.—Very consistent meter measurements have been made covering the range of gage heights for 1912 and the record is excellent.

Cooperation.—Station maintained in cooperation with the Adirondack Electric Power Corporation, the International Paper Co., the Union Bag & Paper Co., and the Finch, Pruyn Paper Co.



A. GAGING STATION ON SACANDAGA RIVER NEAR HOPE, N. Y.



B. RECORDING GAGE HOUSE, HUDSON RIVER AT SPIER FALLS, N. Y.

Discharge measurements of Hudson River at Spier Falls, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Sept. 15[a]	C. C. Covert	−0.06	5.7	Nov. 2	C. S. De Golyer	4.58	4,660
Oct. 31	C. S. De Golyer	4.85	5,320	15	J. G. Mathers	5.95	8,400
31	.....do	4.86	5,330	15	.....do	6.01	8,710
Nov. 1	.....do	4.73	5,030	29	.....do	3.97	3,370
1	.....do	4.50	4,360	30	.....do	3.90	3,150

[a] Made by wading in tailrace of power plant. Plant shut down.

Daily gage height, in feet, and discharge, in second-feet, of Hudson River at Spier Falls, N. Y., for 1912.

[Geo. E. Fifield, observer.]

Day.	October.		November.		December.		Day.	October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			4.41	4,280	3.61	2,710	16	3.59	2,670	5.85	8,160	4.09	3,610
2			4.39	4,240	3.75	2,960	17	3.43	2,390	5.59	7,380	3.91	3,260
3			4.47	4,420	5.27	6,450	18	3.35	2,260	5.35	6,680	3.82	3,090
4			4.33	4,110	6.15	9,090	19	3.33	2,220	5.06	5,870	4.15	3,730
5			4.17	3,770	6.16	9,120	20	1.75	514	4.84	5,300	4.71	4,980
6			4.04	3,510	6.03	8,710	21	3.17	1,960	4.76	5,100	4.86	5,350
7	3.35	2,260	4.18	3,790	6.09	8,900	22	2.76	1,400	4.47	4,420	4.62	4,770
8	2.71	1,340	6.55	10,400	6.11	8,960	23	2.71	1,340	4.46	4,400	4.39	4,240
9	2.89	1,570	7.47	13,800	5.82	8,070	24	4.43	4,330	4.26	3,960	4.14	3,710
10	2.56	1,170	7.56	14,100	5.30	6,530	25	6.27	9,480	4.37	4,190	3.81	3,070
11	2.75	1,390	7.13	12,500	5.15	6,120	26	6.71	11,000	4.34	4,130	3.82	3,090
12	3.03	1,760	6.57	10,500	4.85	5,320	27	6.49	10,200	4.14	3,710	3.72	2,910
13	3.14	1,920	6.07	8,840	4.23	3,890	28	6.10	8,930	4.06	3,550	3.74	2,940
14	3.49	2,490	5.84	8,130	4.07	3,570	29	5.64	7,530	3.91	3,260	3.52	2,550
15	3.47	2,460	5.90	8,310	4.04	3,510	30	5.14	6,090	3.75	2,960	3.72	2,910
							31	4.71	4,980			4.10	3,630

NOTE.—Mean daily gage height obtained by averaging hourly readings for each 24-hour period. Discharge determined from a well-defined rating curve.

Monthly discharge of Hudson River at Spier Falls, N. Y., for 1912.

[Drainage area, 2,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October 7-31	11,000	514	3,750	1.34	1.25	A.
November	14,100	2,960	6,260	2.24	2.50	A.
December	9,120	2,710	4,900	1.75	2.02	A.

HUDSON RIVER AT MECHANICVILLE, N. Y.

Location.—At the Duncan dam of the West Virginia Pulp & Paper Co., in the village of Mechanicville, about 3,700 feet above the mouth of Anthony Kill (coming in from the right), 1¼ miles below the mouth of Hoosic River (coming in from the left), and about 19 miles above the mouth of the Mohawk River, which enters from the right at Cohoes.

Records available.—1892 to 1912. Data also in annual reports of the State engineer and surveyor of New York, of the State Water Supply Commission of New York, and (for 1911) the first annual report of the State of New York Conservation Commission. The records which have been kept at this station are among the longest in the State. They have been used as basic data in all studies of storage problems on the upper Hudson.

Drainage area.—4,500 square miles.

Gage.—Recording gage installed at the dam in the summer of 1910 for the purpose of obtaining a more accurate register of the daily flow over the crest of the dam; previous to 1910 two gage readings daily on the crest of the dam.

Discharge measurements.—Determinations of discharge for periods previous to the summer of 1910 computed by using two daily gage readings on the crest of the dam and continuous record of the run of the wheels in the adjoining paper mill. In 1904 the dam was raised and a concrete crest and apron were added, so that it now has a rounded or ogee section. A discharge curve has been calculated by means of coefficients derived from the United States Geological Survey experiments on dams of ogee section.

Accuracy.—Records at this station are very carefully made and may be considered good for this type of station. In using these records it should be remembered that water is diverted past this station in the Champlain Canal.

Diversions.—Water is diverted past this station through the Champlain Canal. No correction has been made for this diversion. During 1912 the canal was in operation from about May 5 to Dec. 1. See Water Supply Paper 281, page 193.

Cooperation.—Records are computed and furnished by Mr. R. P. Bloss, engineer of the West Virginia Pulp & Paper Co.

Daily discharge, in second-feet, of Hudson River at Mechanicville, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,078	4,205	3,308	21,856	16,338	14,992	2,463	1,168	[a]997	3,074	9,357	[a]2,861
2	8,404	4,205	3,706	22,571	15,408	[a]13,171	1,665	1,102	1,428	2,948	8,519	7,315
3	7,579	3,901	[a]5,157	22,564	13,230	15,567	1,177	1,144	1,178	2,307	[a]6,889	8,285
4	6,186	[a]1,268	2,250	20,260	12,384	11,344	760	[a]960	1,239	2,452	9,284	10,327
5	5,927	3,039	3,483	19,403	[a]9,312	9,652	931	1,124	1,092	3,141	6,909	10,911
6	4,177	3,450	3,080	24,396	12,876	6,962	1,557	978	1,754	[a]1,536	7,221	11,033
7	[a]3,880	3,990	2,318	[a]30,250	10,983	8,479	[a]1,016	1,420	1,414	2,474	7,445	11,434
8	5,390	3,351	2,323	47,275	12,243	7,544	1,825	925	[a]920	2,369	21,688	[a]8,247
9	4,771	3,397	3,905	41,415	9,773	[a]6,289	1,359	1,082	2,040	1,801	20,173	11,111
10	4,362	3,166	[a]6,327	35,752	11,424	6,339	1,412	1,398	2,355	8,818	17,685	11,556
11	4,921	[a]3,929	3,742	30,701	8,674	5,141	1,695	[a]834	1,589	1,667	17,625	11,405
12	4,971	2,138	3,783	25,713	[a]9,354	4,908	1,440	1,337	1,599	2,533	15,374	11,183
13	4,072	3,655	15,944	22,559	9,121	4,753	1,369	2,030	1,216	[a]2,630	13,268	9,052
14	[a]5,178	3,357	10,493	[a]21,900	9,459	4,586	[a]687	1,431	1,296	2,843	10,776	8,873
15	3,978	2,626	9,334	21,780	11,178	4,026	827	1,399	[a]849	3,490	10,968	[a]6,073
16	3,590	2,542	28,889	24,020	10,538	[a]3,189	2,173	1,411	3,208	3,078	13,683	8,472
17	3,965	2,500	[a]17,200	31,082	11,956	4,445	1,350	1,407	4,329	3,233	[a]12,627	6,894
18	2,513	[a]600	16,991	34,767	12,586	3,383	1,265	[a]677	3,503	3,160	12,627	6,164
19	3,243	1,491	16,608	37,401	[a]12,482	3,212	1,305	1,381	3,784	3,078	9,931	7,254
20	4,069	3,306	12,455	36,943	12,612	4,077	1,723	1,961	3,986	[a]748	9,254	8,057
21	[a]5,725	4,606	15,325	[a]31,820	12,596	3,425	[a]1,005	1,403	4,289	2,831	9,296	9,398
22	5,975	3,534	12,804	28,581	17,343	2,707	1,209	1,323	[a]3,455	3,066	9,009	[a]8,367
23	4,445	2,786	11,067	25,246	19,915	[a]2,729	1,154	1,188	4,266	3,230	8,378	9,685
24	4,116	4,378	[a]9,584	31,340	18,484	2,442	1,136	1,607	3,726	27,618	[a]6,617	11,215
25	3,955	[a]4,400	10,564	29,936	17,325	3,270	1,180	[a]810	3,443	19,496	9,771	6,942
26	3,931	4,842	8,222	26,071	[a]15,576	2,152	1,188	1,285	2,416	32,235	9,067	7,366
27	3,297	5,420	7,370	21,825	14,645	1,734	1,173	1,636	2,515	[a]25,599	9,696	6,453
28	[a]5,264	4,412	7,445	[a]20,800	11,974	1,729	[a]906	1,211	3,453	15,089	7,107	5,362
29	3,447	4,019	16,532	20,683	9,852	1,612	1,291	1,172	[a]3,026	12,402	6,704	[a]7,132
30	4,228	....	22,017	20,044	14,475	[a]2,300	1,172	1,291	4,190	10,646	6,341	9,132
31	2,808	....	[a]17,690	....	14,484	....	1,091	1,372	....	10,184	....	10,347

[a] Sunday.

Monthly discharge of Hudson River at Mechanicville, N. Y., for 1912.

[Drainage area, 4,500 square miles.]

Month.	Drainage, in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	9,078	2,513	4,760	1.06	1.22
February	5,420	600	3,400	.756	.82
March	28,889	2,250	10,000	2.22	2.56
April	47,275	19,403	27,600	6.13	6.84
May	19,915	9,121	12,900	2.87	3.31
June	15,567	1,612	5,540	1.23	1.37
July	2,463	760	1,310	.291	.34
August	2,030	677	1,270	.282	.33
September	4,329	849	2,590	.553	.62
October	32,235	748	6,930	1.54	1.78
November	21,688	6,341	10,800	2.40	2.68
December	11,556	2,861	8,640	1.92	2.21
The year	47,275	600	7,950	1.77	24.08

CEDAR RIVER NEAR INDIAN LAKE, N. Y.

Location.—At the steel highway bridge about 2 miles west of Indian Lake village, on the road leading to Blue Mountain Lake, about 12 miles by river above its confluence with the Hudson, 8 miles by river above the mouth of Rock River (tributary from the left) and 10 miles by river below Cedar River Flow (Wakely dam).

Records available.—July 15, 1911, to December 31, 1912. Published also in first annual report of State of New York Conservation Commission.

Drainage area.—85 square miles.

Gage.—Standard chain and weight.

Channel.—Coarse gravel and small bowlders, fairly permanent. Low-water control is gravel rift about 200 feet below the bridge.

Storage.—The basin contains many lakes and swamps affording favorable sites for storage reservoirs which would be influential in regulating the discharge of Hudson River. Those that are important are Cedar Lakes and Cedar River Flow. Cedar River Flow is controlled by a lumberman's dam and is used principally during the logging season.

Accuracy.—Discharge rating curve fairly well defined.

Discharge measurements of Cedar River near Indian Lake, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 11[a]	Frank Weber	4.41	50.5
June 24	G. H. Canfield	2.86	54.2

[a] Under complete ice cover.

Daily gage height, in feet, of Cedar River near Indian Lake, N. Y., for 1912.

[Chauncy Hill, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	6.4	9.85	4.85	2.6	2.5	2.85	3.35	3.1	3.3
2	....	7.1	3.85	4.15	2.6	2.5	2.9	3.7	4.05	3.3
3	....	6.8	4.85	3.4	2.6	2.9	3.2	3.65	3.6	5.75
4	....	6.4	10.05	3.95	2.6	2.95	3.05	3.6	3.4	5.3
5	....	6.25	5.35	4.0	2.55	2.8	2.95	3.4	3.35	5.2
6	....	6.9	5.45	3.8	2.8	2.8	3.1	3.2	3.3	5.2
7	....	9.7	5.35	3.75	2.7	2.75	3.05	3.15	3.4	4.7
8	....	10.15	3.65	2.9	2.65	2.55	2.9	3.05	6.8	4.65
9	....	8.95	3.45	3.95	2.6	2.55	2.85	3.1	6.7	4.25
10	....	8.0	3.55	3.0	2.6	2.6	2.85	3.25	6.0	6.15
11	4.35	6.6	3.45	4.3	2.65	2.8	2.9	3.0	5.8	5.6
12	4.45	6.25	3.65	4.0	2.65	2.85	2.8	3.25	5.0	4.8
13	4.35	5.5	3.6	3.9	2.65	2.8	2.8	3.3	3.95	4.8
14	4.45	6.15	9.65	3.75	3.9	2.8	2.8	3.1	3.6	4.75
15	4.4	6.1	3.3	3.0	3.5	2.65	2.75	3.05	3.5	4.7
16	5.8	9.65	3.5	2.95	2.9	2.6	3.3	2.8	3.65	4.7
17	6.55	9.55	4.35	2.85	2.7	2.55	3.0	2.8	3.45	4.5
18	6.15	7.4	5.45	2.9	2.6	2.6	2.9	2.85	3.4	4.7
19	5.9	7.05	5.65	2.85	3.0	2.65	3.1	2.95	4.75	4.9
20	6.0	6.1	5.95	2.85	2.5	2.6	3.35	3.0	4.55	5.4
21	6.0	5.75	6.05	2.95	3.3	2.6	3.4	2.8	4.7	5.35
22	5.75	6.3	6.45	2.85	3.2	2.95	4.35	2.9	4.3	5.25
23	5.6	10.15	5.95	2.8	2.6	2.8	4.5	3.0	3.6	4.95
24	5.75	4.85	9.0	2.8	2.7	2.8	3.6	3.9	3.3	4.9
25	5.5	4.25	5.0	2.82	2.6	2.75	3.7	6.3	3.5	4.85
26	5.3	4.4	4.65	2.78	2.6	2.7	3.95	5.6	3.45	4.45
27	5.6	4.45	4.25	2.75	2.6	2.8	4.2	5.35	3.4	4.4
28	5.25	9.15	4.25	2.7	2.5	2.85	3.7	4.65	3.1	4.4
29	5.5	4.1	4.0	2.65	2.5	2.75	3.3	4.4	2.8	4.4
30	6.0	3.85	5.65	2.6	2.6	2.7	3.3	4.2	3.3	4.35
31	6.1	....	5.15	....	2.6	2.8	....	4.15	....	4.3

NOTE.—Relation of gage height to discharge affected by ice Mar. 11 to Apr. 15 and Dec. 10–13 and 20–31. Ice and log jam Apr. 16. River open Apr. 17.

Daily discharge, in second-feet, of Cedar River near Indian Lake, N. Y., for 1911–12.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.							1911.						
1	......	30	26	35	155	243	16	29	26	80	50	74	479
2	......	29	26	50	196	243	17	29	29	254	52	176	404
3	......	29	34	46	232	132	18	43	29	83	50	281	369
4	......	29	29	107	93	123	19	32	32	69	54	294	179
5	......	26	29	123	96	132	20	29	32	50	69	257	140
6	......	26	29	221	100	175	21	34	29	48	69	140	123
7	......	26	54	243	140	190	22	32	29	48	69	132	107
8	......	26	54	243	169	190	23	29	29	50	179	150	804
9	......	26	100	221	180	150	24	30	29	50	243	107	731
10	......	26	132	54	180	326	25	29	28	29	243	107	517
11	......	29	137	54	180	404	26	26	32	29	100	107	364
12	......	29	110	59	180	957	27	26	29	29	100	104	300
13	......	29	100	59	150	786	28	29	41	26	159	110	250
14	......	28	61	52	120	804	29	32	52	32	107	343	200
15	30	26	57	50	100	508	30	30	42	35	96	318	180
							31	30	34	......	107	......	150

Daily discharge, in second-feet, of Cedar River near Indian Lake, for 1911–12—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.									
1	....	2,520	459	35	29	54	115	80	107
2	....	210	478	35	29	59	179	254	107
3	....	459	123	35	59	93	169	159	749
4	....	2,620	232	35	64	74	159	123	595
5	....	612	243	32	50	64	123	115	563
6	....	645	200	50	50	80	93	107	563
7	....	612	190	42	46	74	86	123	417
8	....	169	59	38	32	59	74	1,160	404
9	....	132	232	35	32	54	80	1,120	301
10	....	150	69	35	35	54	100	842	....
11	....	132	313	38	50	59	69	767	....
12	....	169	243	38	54	50	100	502	....
13	....	159	221	38	50	50	107	232	....
14	....	2,420	190	221	50	50	80	159	431
15	....	107	69	140	38	46	74	140	417
16	2,420	140	64	59	35	107	50	169	417
17	2,370	326	54	42	32	69	50	132	364
18	1,410	645	59	35	35	59	54	123	417
19	1,260	714	54	69	38	80	64	431	473
20	880	823	54	29	35	115	69	377	....
21	749	861	64	107	35	123	50	417	....
22	957	1,020	54	93	64	326	59	313	....
23	2,670	823	50	35	50	364	69	159	....
24	459	2,120	50	42	50	159	221	107	....
25	301	502	52	35	46	179	957	140	....
26	338	404	48	35	42	232	696	132	....
27	351	301	46	35	50	289	612	123	....
28	2,180	301	42	29	54	179	404	80	....
29	266	243	38	29	46	107	338	50	....
30	210	714	35	35	42	107	289	107	....
31	....	548	....	35	50	....	278	....	....

NOTE.—Daily discharge determined from a fairly well-defined rating curve based on measurements made in 1912 and 1913. Discharges Nov. 9–15 and Dec. 27–31, 1911, estimated.

Monthly discharge of Cedar River near Indian Lake, N. Y., for 1911–12.

[Drainage area, 85 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
July 15–31	43	26	30.5	0.359	0.23	B.
August	52	26	30.2	.355	.41	B.
September	254	26	63.0	.741	.83	B.
October	243	35	109	1.28	1.47	A.
November	343	74	164	1.93	2.15	A.
December	957	107	344	4.05	4.67	A.
1912.						
May	2,620	107	697	8.20	9.45	B.
June	478	35	136	1.60	1.78	A.
July	221	29	51.3	.604	.70	B.
August	64	29	44.3	.521	.60	B.
September	364	46	114	1.34	1.50	B.
October	957	50	189	2.22	2.56	A.
November	1,160	50	291	3.42	3.82	A.

INDIAN LAKE RESERVOIR AT INDIAN LAKE, N. Y.

Location.—At the masonry storage dam at the outlet of Indian Lake, about 7½ miles above the confluence of Indian River with the Hudson and about 23½ miles above the village of North Creek.

Records available.—July 22, 1900, to December 31, 1912. Data also in annual reports of the State engineer and surveyor, State Water Supply Commission, and State Conservation Commission.

Drainage area.—131 square miles, including about 9.3 square miles of water surface of Indian Lake at the elevation of the spillway of the dam.

Gage.—Staff; read once daily. November 17, 1911, a chain gage was installed on the crest of the dam to replace the staff gage. Datum of both gages the same and unchanged since the establishment of the station.

Discharge measurements.—The record of this station includes elevation of water surface in the reservoir, depth of water flowing over the spillway or flashboards, depth of opening, and the effective head on each of the 5-foot sluice gates. A meteorologic station has also been established at the dam by the United States Weather Bureau and records are kept of the rainfall, temperature, etc. The crest of the dam is 106.05 feet in the clear. To facilitate the calculation of discharge over the spillway, experiments were made at Cornell University in 1899 on a full-size model of the spillway section, 6.58 feet long, from which the coefficient of discharge has been determined. No computations of discharge have been made pending current meter measurements to rate discharge through gates. At present, records of reservoir level and gate openings are available. The elevation of the crest of the spillway above mean tide is 1,650 feet.

Artificial control.—The flow of the upper Hudson has been controlled to a considerable extent during the dry season by the use of Indian Lake reservoir since its completion in 1899. The storage provided, about 4,700,000,000 cubic feet, affording a discharge of nearly 600 second-feet for a period of 90 to 130 days each year.

Maximum and minimum gage heights.—Maximum gage height at Indian Lake Reservoir since the establishment of the station recorded April 27, 1908, 37.00 feet; minimum gage height, recorded March 9 to 18, 1907, and January 3 to 17, 1910, 2.00 feet.

Daily gage height, in feet, of Indian Lake Reservoir at Indian Lake, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	29.35	26.50	17.35	15.20	34.55	34.95	32.60	26.20	16.90	14.60	17.30	23.80
2	29.45	26.20	17.00	15.50	34.65	34.90	32.45	26.00	16.60	14.70	17.70	24.00
3	29.55	25.90	16.70	15.80	34.80	34.80	32.30	25.80	16.40	14.80	17.90	24.30
4	29.65	25.55	16.40	16.05	34.90	34.70	32.20	25.40	16.15	14.90	18.10	24.60
5	29.75	25.20	16.10	16.45	35.00	34.60	32.10	25.05	15.95	15.00	18.30	24.90
6	29.80	24.85	15.80	16.45	35.10	34.50	32.00	24.70	15.70	15.05	18.40	25.20
7	29.70	24.50	15.50	17.70	35.15	34.40	31.90	24.40	15.50	15.10	18.65	25.50
8	29.50	24.20	15.20	18.80	35.10	34.30	31.80	24.05	15.25	15.10	19.70	25.85
9	29.30	23.90	14.95	19.70	35.15	34.30	31.30	23.75	15.00	14.90	20.50	25.95
10	29.40	23.55	14.70	20.30	35.00	34.30	31.05	23.40	14.70	14.75	21.00	26.00
11	29.45	23.15	14.45	20.60	34.85	34.25	30.80	23.05	14.40	14.65	21.25	26.10
12	29.50	22.85	14.20	20.90	34.80	34.15	30.55	22.90	14.10	14.65	21.50	26.20
13	29.55	22.55	13.95	21.20	34.72	34.10	30.35	22.60	13.80	14.50	21.70	26.30
14	29.60	22.25	13.70	21.90	34.75	34.05	30.15	22.20	13.60	14.40	21.95	26.40
15	29.65	21.85	13.50	22.90	34.80	34.05	29.90	21.90	13.30	14.30	22.20	26.50
16	29.70	21.50	13.30	23.90	34.85	34.00	29.65	21.60	13.20	14.20	22.35	26.60
17	29.55	21.15	13.10	24.90	35.10	34.00	29.50	21.15	13.10	14.30	22.55	26.70
18	29.35	20.85	13.00	25.70	35.20	34.00	29.25	20.90	13.00	14.40	22.65	26.75
19	29.10	20.50	13.20	26.70	35.20	33.95	29.00	20.60	13.00	14.50	22.80	26.90
20	28.90	20.20	13.50	27.50	35.25	33.90	28.70	20.30	13.15	14.55	22.90	27.10

Daily gage height, in feet, of Indian Lake Reservoir at Indian Lake, N. Y., for 1912—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	28.70	19.90	13.60	28.20	35.40	33.85	28.65	20.05	13.25	14.65	23.00	27.30
22	28.50	19.60	13.70	28.90	35.60	33.80	28.40	19.80	13.40	14.75	23.10	27.40
23	28.30	19.30	13.80	30.40	35.65	33.80	28.20	19.55	13.50	14.85	23.15	27.50
24	28.10	18.95	13.90	31.30	35.60	33.70	28.00	19.25	13.60	15.00	23.20	27.60
25	27.95	18.70	14.00	31.85	35.50	33.55	27.80	19.00	13.75	15.75	23.35	27.70
26	27.80	18.40	14.15	32.30	35.40	33.35	27.60	18.70	14.00	16.20	23.50	27.80
27	27.65	18.15	14.25	33.00	35.25	33.25	27.35	18.40	14.15	16.60	23.60	27.90
28	27.45	17.90	14.35	33.60	35.10	33.15	27.10	18.10	14.25	16.80	23.65	28.00
29	27.25	17.65	14.45	34.10	35.00	32.95	26.85	17.80	14.35	16.95	23.70	28.10
30	27.05	....	14.60	34.35	34.95	32.75	26.70	17.50	14.40	17.10	23.75	28.20
31	26.85	....	14.85	....	35.00	....	26.45	17.20	....	17.20	....	28.25

Gage openings, in feet, of Indian Lake Reservoir at Indian Lake, N. Y., for 1912.

Date.	Sluice Gate A open.	Sluice Gate B open.	Date.	Sluice Gate A open.	Sluice Gate B open.
Jan. 7–Jan. 9	....	5.0	June 23–July 7	....	2.5
Jan. 16–Mar. 17	....	5.0	July 8–July 9 [a]	5.0	....
Jan. 31–Feb. 14	2.5	....	July 8–Sept. 18	....	5.0
Feb. 15–Mar. 17	3.0	....	Aug. 2–Sept. 18	2.5	....
May 6–May 14	.6	....	Oct. 8–Oct. 16	....	5.0

[a] This date not recorded. Estimated from gage heights on Indian River at Indian Lake.

INDIAN RIVER NEAR INDIAN LAKE, N. Y.

Location.—About three-fourths of a mile below State dam, at the outlet of Indian Lake, 1 mile above the mouth of Big Brook (the only important tributary of Indian River below this station), and 8 miles above the point where it enters the Hudson.

Records available.—Miscellaneous measurements, 1911; July 1 to December 31, 1912.

Drainage area.—132 square miles.

Gage.—Vertical staff, nailed to stump.

Channel.—Pond of still water at head of rocky rapids; a well-defined, permanent, rock control exists below the station.

Artificial control.—The flow of Indian River is controlled at the lake.

Discharge measurements.—Made by wading at head of rapids about 150 feet below gage.

Winter flow.—Because of the swift current in the rapids the water probably never freezes on the control and, although ice will form around the gage in the still water, the relation of gage height to discharge will probably not be seriously affected.

Accuracy.—The rating curve is not yet developed.

Discharge measurements of Indian River near Indian Lake, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 27[a]	G. H. Canfield	2.34	364
27[b]	.....do	1.12	83.1

[a] Made at bridge.

[b] Made by wading 150 feet below gage.

Daily gage height, in feet, of Indian River near Indian Lake, N. Y., for 1912.

[Lester Severie, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	2.55	2.85	0.15	0.15	0.1	16	2.7	3.1	2.65	2.15	.15	.25
2	2.3	2.55	2.85	.1	.15	.15	17	2.7	3.1	2.6	.1	.15	.25
3	2.3	3.25	2.85	.1	.15	.2	18	2.7	3.1	2.6	.1	.15	.25
4	2.3	3.25	2.8	.1	.15	.2	19	2.65	3.05	.1	.1	.15	.3
5	2.3	3.25	2.8	.1	.15	.2	20	2.65	3.05	.1	.1	.15	.3
6	2.3	3.25	2.8	.1	.15	.2	21	2.65	3.05	.1	.1	.15	.3
7	2.3	3.25	2.75	.1	.15	.25	22	2.65	3.05	.1	.1	.15	.3
8	3.65	3.2	2.75	.1	.4	.25	23	2.65	3.05	.15	.15	.15	.3
9	3.65	3.2	2.75	2.2	.3	.25	24	2.65	3.0	.15	.15	.15	.3
10	2.75	3.2	2.75	2.2	.2	.25	25	2.6	3.0	.15	.15	.15	.3
11	2.75	3.2	2.7	2.2	.2	.25	26	2.6	3.0	.15	.15	.15	.3
12	2.75	3.15	2.7	2.2	.15	.25	27	2.6	2.95	.15	.15	.15	.25
13	2.7	3.15	2.7	2.15	.15	.25	28	2.6	2.95	.15	.15	.15	.25
14	2.7	3.15	2.65	2.15	.2	.25	29	2.6	2.95	.15	.15	.1	.4
15	2.7	3.15	2.65	2.15	.2	.25	30	2.6	2.9	.15	.15	.1	.4
							31	2.6	2.9	.15	.15	......	.4

Daily discharge, in second-feet, of Indian River near Indian Lake, N. Y., for 1912.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	353	436	545	1.5	1.5	1.0	16	489	643	471	307	1.5	3.5
2	353	436	545	1.0	1.5	1.5	17	489	643	453	1.0	1.5	3.5
3	353	704	545	1.0	1.5	2.0	18	489	643	453	1.0	1.5	3.5
4	353	704	526	1.0	1.5	2.0	19	471	623	1.0	1.0	1.5	5.0
5	353	704	526	1.0	1.5	2.0	20	471	623	1.0	1.0	1.5	5.0
6	353	704	526	1.0	1.5	2.0	21	471	623	1.0	1.0	1.5	5.0
7	353	704	508	1.0	1.5	3.5	22	471	623	1.0	1.0	1.5	5.0
8	875	684	508	1.0	9.0	3.5	23	471	623	1.5	1.5	1.5	5.0
9	875	684	508	322	5.0	3.5	24	471	603	1.5	1.5	1.5	5.0
10	508	684	508	322	2.0	3.5	25	453	603	1.5	1.5	1.5	5.0
11	508	684	489	322	2.0	3.5	26	453	603	1.5	1.5	1.5	5.0
12	508	663	489	322	1.5	3.5	27	453	584	1.5	1.5	1.5	3.5
13	489	663	489	307	1.5	3.5	28	453	584	1.5	1.5	1.5	3.5
14	489	663	471	307	2.0	3.5	29	453	584	1.5	1.5	1.0	9.0
15	489	663	471	307	2.0	3.5	30	453	564	1.5	1.5	1.0	9.0
							31	453	564	......	1.5	......	9.0

NOTE.—Daily discharge determined from a rating curve well defined above 15 second-feet and based on measurements made during 1912 and 1913. Discharge for days when gates were changed may be considerably in error.

Monthly discharge of Indian River near Indian Lake, N. Y., for 1912.

[Drainage area, 146 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
July	875	353	473	3.24	3.74	A.
August	704	436	629	4.31	4.97	A.
September	545	1	302	2.07	2.31	A.
October	322	1	82.1	.562	.65	B.
November	9	1	1.90	.013	.01	D.
December	9	1	4.08	.028	.03	D.

SCHROON RIVER AT RIVERBANK, N. Y.

Location.—At the highway bridge 12 miles above the confluence of Schroon River with the Hudson, 9 miles below the mouth of Schroon Lake, about 3½ miles below the outlet of Brant Lake (coming in from the left), and 1 mile below Tumblehead Falls, which extend upstream about a mile farther. The station is about 9 miles north of Warrensburg, where there are several dams used for power development.

Records available.—September 2, 1907, to December 31, 1912. Data also in annual reports of New York State Water Supply Commission, State engineer and surveyor, and State Conservation Commission.

Drainage area.—534 square miles.

Gage.—Chain; read once daily; datum unchanged.

Channel.—Gravel; smooth and permanent.

Discharge measurements.—Made from the bridge.

Artificial control.—Since 1907 the regimen of flow of Schroon River, from the low-water period to the high, has been somewhat affected by storage in Schroon Lake. In September, 1907, a timber crib dam was constructed at Starbuckville about 6 miles above the station. This dam affords a head of about 8 feet and ponds water to Schroon Lake.

Winter flow.—Affected by ice.

Accuracy.—Open-water curve well developed. Measurements made through the ice have developed a fairly good ice-discharge curve.

Discharge measurements of Schroon River at Riverbank, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
1912.		*Feet.*	*Sec.-ft.*
Jan. 21[a]	G. H. Canfield	3.60	546
Feb. 9[b]	Frank Weber	2.80	394
Mar. 1[b]	Alexander McMillan	2.66	330
June 7[c]	Frank Weber	3.62	1,090
7[c]	....do	3.61	1,090

[a] Measurement made under complete ice cover 2,000 feet downstream from bridge.
[b] Made at regular section, under complete ice cover.
[c] Log jam below gage.

Daily gage height, in feet, of Schroon River at Riverbank, N. Y., for 1912.

[T. H. Roberts, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	3.0	2.66	2.8	4.7	4.5	1.35	1.35	1.30	1.30	3.1	2.9
2	3.6	2.8	2.5	3.6	4.4	4.3	1.35	1.35	1.45	1.32	3.1	2.85
3	3.6	3.4	2.55	3.8	4.2	4.3	1.25	1.35	1.50	1.28	2.95	2.95
4	3.5	3.3	2.5	3.8	4.2	4.0	1.20	1.30	1.45	1.30	2.9	3.0
5	3.4	3.2	2.4	4.0	4.1	4.0	1.30	1.32	1.45	1.8	2.9	3.1
6	3.9	3.2	2.45	4.4	4.1	3.8	1.35	1.30	1.48	1.30	2.9	3.1
7	4.1	3.0	2.4	5.0	4.4	3.6	1.35	2.1	1.50	2.0	3.0	3.0
8	4.0	2.8	2.3	6.0	4.4	3.4	1.38	1.75	1.50	2.0	3.2	3.3
9	4.4	2.8	2.35	6.8	4.5	3.3	1.35	2.05	1.48	2.0	3.5	3.4
10	4.2	2.85	2.25	6.8	4.3	3.5	1.50	1.55	1.35	2.0	3.8	3.4
11	4.6	2.9	2.25	6.6	4.3	3.8	1.40	1.50	1.50	1.9	3.8	3.4
12	4.5	2.9	2.25	6.2	4.0	3.6	1.40	1.55	1.50	1.85	3.8	3.3
13	4.6	2.9	2.25	5.9	4.3	3.6	1.50	1.50	1.45	1.25	3.8	3.2
14	4.9	2.85	2.30	5.8	3.9	3.4	1.40	1.45	1.50	2.0	3.8	3.1
15	5.2	2.8	2.3	5.6	4.0	3.4	1.35	1.40	2.1	2.0	3.9	3.0

Daily gage height, in feet, of Schroon River at Riverbank, N. Y., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	4.0	2.75	2.5	5.8	4.4	1.9	1.30	1.38	2.0	2.0	4.0	2.9
17	4.3	2.7	2.5	6.4	3.0	3.0	1.30	1.55	2.0	1.9	4.0	2.8
18	4.0	2.75	2.5	7.0	4.5	2.9	1.35	1.40	2.0	2.0	3.9	2.8
19	4.1	2.55	2.6	7.3	4.6	2.95	1.30	1.40	2.0	1.55	3.7	2.9
20	3.6	2.45	2.55	7.4	4.9	2.85	1.40	1.45	2.0	1.6	3.6	3.0
21	3.0	2.35	2.5	7.1	5.0	2.6	1.40	1.45	1.8	1.95	3.6	3.0
22	2.6	2.4	2.55	6.8	5.4	2.05	1.40	1.45	1.25	2.0	3.5	2.85
23	2.45	2.4	2.6	6.8	5.5	2.3	1.35	1.95	1.8	2.0	3.3	2.9
24	2.45	2.45	2.6	6.9	5.7	2.3	1.40	1.8	2.0	2.25	3.3	2.9
25	3.6	2.5	2.65	6.6	5.8	2.5	1.40	1.35	2.0	2.35	3.3	2.7
26	3.6	2.55	2.55	6.2	5.6	2.5	1.40	2.0	2.05	2.55	3.2	2.6
27	3.4	2.55	2.6	5.9	5.4	2.6	1.40	1.55	2.0	3.0	3.2	2.55
28	2.35	2.65	2.6	5.6	5.0	1.55	1.35	1.42	1.7	3.0	3.1	2.6
29	3.4	2.6	2.8	5.4	4.8	1.55	1.40	1.32	1.25	3.1	3.0	2.55
30	3.2	......	2.8	5.0	4.6	1.35	1.40	1.28	2.0	3.1	3.0	2.5
31	3.1	......	2.85	......	4.6	......	1.40	1.25	......	3.1	......	1.65

NOTE.—Relation of gage height to discharge affected by ice Jan. 6 to Mar. 26. Relation of gage height to discharge affected by log jams Apr. 5–8 and May 7 to June 13.

Daily discharge, in second-feet, of Schroon River at Riverbank, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,290	400	330	721	2,440	1,880	143	143	130	130	900	776
2	1,290	400	260	1,290	2,100	1,680	143	143	170	135	900	748
3	1,290	400	282	1,470	1,890	1,680	118	143	184	125	806	806
4	1,200	400	260	1,470	1,890	1,400	105	130	170	130	776	836
5	1,120	400	220	1,400	1,780	1,400	130	135	170	276	776	900
6	1,100	400	240	1,780	1,780	1,240	143	130	178	130	776	900
7	1,050	400	220	2,440	1,780	1,080	143	390	184	350	836	836
8	1,000	395	180	3,690	1,780	940	151	259	184	350	966	1,040
9	950	394	200	5,200	1,880	875	143	370	178	350	1,200	1,120
10	900	420	160	5,200	1,680	1,010	184	198	143	350	1,470	1,120
11	850	445	160	4,900	1,680	1,240	156	184	184	312	1,470	1,120
12	800	445	160	4,310	1,400	1,080	156	198	184	294	1,470	1,040
13	750	445	160	3,900	1,680	1,080	184	184	170	118	1,470	966
14	700	420	180	3,770	1,320	1,120	156	170	184	350	1,470	900
15	650	395	180	3,520	1,400	1,120	143	156	390	350	1,570	836
16	500	372	260	3,770	1,780	312	130	151	350	350	1,670	776
17	600	350	260	4,600	1,880	836	130	198	350	312	1,670	721
18	550	372	290	5,500	1,880	776	143	156	350	350	1,570	721
19	550	282	370	5,960	1,990	806	130	156	350	198	1,380	776
20	546	240	380	6,120	2,320	748	156	170	350	212	1,290	836
21	500	200	390	5,640	2,440	618	156	170	276	331	1,290	836
22	500	220	450	5,200	2,920	370	156	170	118	350	1,200	748
23	440	220	510	5,200	3,040	476	143	331	276	350	1,040	776
24	440	240	540	5,350	3,290	476	156	276	350	454	1,040	776
25	420	260	610	4,900	3,420	568	156	143	350	500	1,040	668
26	400	282	593	4,310	3,160	568	156	350	370	593	966	618
27	390	282	618	3,900	2,920	618	156	198	350	836	966	593
28	370	328	618	3,520	2,440	198	143	162	242	836	900	618
29	390	305	721	3,280	2,210	198	156	135	118	900	836	593
30	390	......	721	2,800	1,990	143	156	125	350	900	836	568
31	400	......	748	......	1,990	......	156	118	......	900	......	226

NOTE.—Daily discharge Jan. 1–5, Apr. 9 to May 6, and June 14 to Dec. 31 determined from a well-defined rating curve. Daily discharge Jan. 6 to Apr. 4 determined by means of a rating curve based on measurements made with ice present, observers' notes, and climatological records. Daily discharge Apr. 5–8 and May 7 to June 13 determined from a fairly well-defined rating curve based on measurements made during the existence of log jams.

Monthly discharge of Schroon River at Riverbank, N. Y., for 1912

[Drainage area, 534 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,290	370	720	1.35	1.56	C.
February	445	200	349	.654	.71	C.
March	748	160	364	.682	.79	C.
April	6,120	721	3,840	7.19	8.02	B.
May	3,420	1,320	2,130	3.99	4.60	B.
June	1,880	143	885	1.66	1.85	B.
July	184	105	148	.277	.32	B.
August	390	118	192	.360	.42	B.
September	390	118	245	.459	.51	B.
October	900	118	391	.732	.84	B.
November	1,670	776	1,150	2.15	2.40	B.
December	1,120	226	800	1.50	1.73	B.
The year	6,120	105	931	1.74	23.75	

SACANDAGA RIVER NEAR HOPE, N. Y.

Location.—About 3½ miles above the post office at Hope, 4 miles below the village of Wells, 12 miles above Northville (the nearest railroad station), and 1½ miles below the junction of the East and West branches of the Sacandaga. (See Pl. III, *A*, p. 138.)

Records available.—September 15, 1911, to December 31, 1912.

Drainage area.—494 square miles.

Gage.—Staff in two sections; a sloping staff reading from 1.00 foot to 4.30 feet, on a slope of 2.5 to 1; a vertical staff (for high water records) attached to a rocky cliff in line with the sloping gage.

Channel.—Very rough, but permanent; banks are fairly free from timber; high and rocky; channel has been cleared of bowlders to some extent.

Discharge measurements.—Made from a cable with a span of 214 feet.

Accuracy.—The open-water rating curve is well defined and estimates for this period are good.

Discharge measurements of Sacandaga River near Hope, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 3	C. S. De Golyer	4.24	2,290	Apr. 8	C. S. De Golyer	6.70	8,440
4	do	4.02	1,910	9	do	5.65	5,400
5	do	3.99	1,930	Aug. 6[a]	J. G. Mathers	1.53	75.4
5	do	4.34	2,420	Sept. 12[a]	G. H. Canfield	1.76	141
6	do	5.01	3,820	13[a]	do	1.50	71.5

[a] Measurement made by wading at regular section.

Daily gage height, in feet, of Sacandaga River near Hope, N. Y., for 1912.

[Edgar Coulombe, observer.]

Day.	Jan.	Feb.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.55	5.5	4.4	4.2	3.7	1.67	1.44	1.36	2.34	3.00	2.65
2	3.4	5.0	4.4	4.2	3.45	1.65	1.48	1.60	2.44	3.30	2.75
3	3.25	4.8	4.2	4.0	3.4	1.71	1.58	1.86	2.31	3.15	5.0
4	3.1	4.8	4.1	4.0	3.25	1.70	1.56	2.00	2.30	3.0	4.4
5	3.1	4.7	4.2	3.6	3.1	1.64	1.54	1.85	2.24	2.95	4.2
6	2.9	4.7	5.4	4.2	2.95	1.62	1.52	1.78	2.20	2.90	4.2
7	2.8	4.6	6.7	4.1	2.9	1.66	1.48	1.83	2.13	3.45	4.3
8	2.9	....	6.6	3.95	2.85	1.74	1.48	1.73	2.06	6.0	4.1
9	2.85	....	5.6	3.8	2.75	1.65	1.47	1.72	2.01	5.0	3.55
10	2.85	....	5.1	3.85	2.6	1.59	1.52	1.60	2.02	4.5	3.6
11	2.9	....	4.8	3.9	2.5	1.54	1.74	1.64	2.10	4.2	3.55
12	3.0	....	4.5	3.9	2.42	1.57	1.80	1.68	2.23	3.9	3.2
13	3.7	....	5.0	3.7	2.40	1.48	1.55	1.50	2.28	3.8	2.95
14	4.0	....	4.7	3.65	2.32	1.60	1.60	1.52	2.30	3.85	3.0
15	4.6	....	5.5	3.7	2.29	1.87	1.47	1.60	2.20	3.9	3.0
16	4.8	....	6.6	3.9	2.30	1.88	1.52	2.50	2.14	3.7	2.95
17	5.0	....	6.8	4.4	2.30	1.68	1.52	2.44	2.08	3.6	2.8
18	5.1	....	6.6	4.9	2.25	1.57	1.54	2.02	2.05	3.5	2.85
19	5.3	....	6.6	4.2	2.18	1.62	1.58	2.16	2.20	3.4	3.3
20	5.8	....	6.0	4.5	2.04	1.47	1.56	2.20	2.6	3.3	3.5
21	6.0	....	5.7	5.3	1.94	1.56	1.54	2.10	2.55	3.2	3.5
22	6.0	....	5.6	4.5	1.98	2.00	1.65	2.01	2.48	3.1	3.25
23	6.0	....	7.1	5.1	1.83	1.84	1.73	1.96	2.65	3.05	3.15
24	6.0	....	6.1	4.7	1.87	1.68	1.73	2.20	4.1	3.0	3.05
25	6.0	....	5.6	4.6	1.83	1.77	1.65	2.60	5.1	3.0	3.0
26	5.7	....	5.5	4.1	1.84	1.66	1.66	2.85	4.3	3.0	2.8
27	5.5	....	5.1	4.0	1.82	1.54	1.66	2.60	3.95	2.9	2.85
28	5.5	....	4.8	3.75	1.74	1.42	1.61	2.48	3.65	2.7	2.75
29	5.5	....	4.2	3.45	1.70	1.39	1.58	2.36	3.5	2.65	2.75
30	5.5	....	4.5	4.0	1.69	1.40	1.46	2.38	3.30	2.75	2.75
31	5.5	....	....	3.9	....	1.42	1.45	....	3.05	....	3.4

NOTE.—Relation of gage height to discharge affected by ice Jan. 11 to Mar. 21, 1912.

Daily discharge, in second-feet, of Sacandaga River near Hope, N. Y., for 1911–12.

Day.	Sept.	Oct.	Nov.	Dec.
1911.				
1	....	358	990	1,290
2	....	666	900	1,460
3	....	598	820	1,140
4	....	1,850	740	820
5	....	1,240	703	740
6	....	900	666	820
7	....	945	1,040	740
8	....	1,040	2,070	666
9	....	990	1,720	703
10	....	860	1,520	860
11	....	780	1,520	1,240
12	....	666	1,400	2,390
13	....	598	1,920	4,230
14	....	534	1,650	3,330
15	339	474	1,460	2,560
16	435	440	1,290	2,070
17	362	424	990	2,560
18	303	1,090	2,390	2,070
19	256	2,740	1,850	1,720
20	227	2,070	1,580	1,240
21	204	1,780	1,400	1,290
22	219	1,650	1,240	1,290
23	219	2,740	990	5,250
24	204	2,230	1,090	3,540
25	192	1,780	990	2,560
26	174	1,460	900	2,390
27	171	1,240	860	2,230
28	171	1,140	780	1,920
29	235	1,040	1,650	1,290
30	377	900	1,520	1,400
31	....	900	....	1,370

Daily discharge, in second-feet, of Sacandaga River near Hope, N. Y., for 1911–12—Continued.

Day.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.										
1	1,340	2,560	2,230	1,520	118	57	40	387	820	566
2	1,190	2,560	2,230	1,240	112	66	97	440	1,090	632
3	1,040	2,230	1,920	1,190	130	92	182	372	945	3,760
4	900	2,070	1,920	1,040	127	87	235	367	820	2,560
5	900	2,230	1,400	900	109	81	178	339	780	2,230
6	740	4,730	2,230	780	103	76	153	321	740	2,230
7	666	8,450	2,070	740	115	66	171	290	1,240	2,390
8	740	8,140	1,850	703	140	66	137	260	6,350	2,070
9	703	5,250	1,650	632	112	64	134	239	3,760	1,340
10	703	3,990	1,720	534	94	76	97	243	2,740	1,400
11	....	3,330	1,780	474	81	140	109	277	2,230	1,340
12	....	2,740	1,780	429	89	160	121	335	1,780	990
13	....	3,760	1,520	418	66	84	71	358	1,650	780
14	....	3,130	1,460	377	97	97	76	367	1,720	820
15	....	4,990	1,520	362	185	64	97	321	1,780	820
16	....	8,140	1,780	367	189	76	474	295	1,520	780
17	....	8,760	2,560	367	121	76	440	269	1,400	666
18	....	8,140	3,540	344	89	81	243	256	1,290	703
19	....	8,140	2,230	312	103	92	303	321	1,190	1,090
20	....	6,350	2,740	262	64	87	321	534	1,090	1,290
21	....	5,520	4,480	212	87	81	277	504	990	1,290
22	....	5,250	2,740	227	235	112	239	463	900	1,040
23	....	9,690	3,990	171	174	137	219	566	860	945
24	....	6,640	3,130	185	121	137	321	2,070	820	860
25	....	5,250	2,930	171	150	112	534	3,990	820	820
26	....	4,990	2,070	174	115	115	703	2,390	820	666
27	....	3,990	1,920	167	81	115	534	1,850	740	703
28	....	3,330	1,580	140	53	100	463	1,460	598	632
29	....	2,230	1,240	127	46	92	398	1,290	566	632
30	....	2,740	1,920	124	48	62	408	1,090	632	632
31	....	....	1,780	....	53	60	....	860	....	1,190

NOTE.—Daily discharge Sept. 15, 1911, to Jan. 10, 1912, and Apr. 1 to Dec. 31, 1912, determined from a well-defined rating curve.

Monthly discharge of Sacandaga River near Hope, N. Y., for 1911–12.

[Drainage area, 494 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
September 15–30	435	171	256	0.518	0.31	A.
October	2,740	358	1,170	2.37	2.73	A.
November	2,390	666	1,290	2.61	2.91	A.
December	5,250	666	1,840	3.72	4.29	A.
1912.						
January	....	....	600	1.21	1.40	C.
February	....	....	300	.607	.65	C.
March	....	....	900	1.82	2.10	C.
April	9,690	2,070	4,980	10.1	11.27	A.
May	4,480	1,240	2,190	4.43	5.11	A.
June	1,520	124	489	.990	1.10	A.
July	235	46	110	.223	.26	A.
August	160	57	90.7	.184	.21	A.
September	703	40	259	.524	.58	A.
October	3,990	239	746	1.51	1.74	A.
November	6,350	566	1,420	2.87	3.20	A.
December	3,760	566	1,220	2.47	2.85	A.
The year	9,690	40	1,110	2.25	30.47	

NOTE.—Discharge Jan. 11 to Mar. 31, 1912, estimated by comparison with the discharge at Hadley. Mean discharge Jan. 11 to 31, 1912, estimated 460 second-feet.

SACANDAGA RIVER AT HADLEY, N. Y.

Location.—About half a mile west of the railroad station at Hadley, 1 mile above the confluence of Sacandaga River with the Hudson, and 4½ miles below the site of the proposed storage dam at Conklingville. No tributaries between this station and the mouth of the river. Location selected to avoid inaccuracies in the records caused by backwater from log jams. This station replaces the upper bridge station and the lower bridge station.

Records available.—September 13, 1907, to December 31, 1910, upper bridge station; September 24, 1909, to July 7, 1911, lower bridge station; January 1, 1911, to December 31, 1912, present station. Data also in annual reports of the New York State Water Supply Commission, State Conservation Commission, and State engineer and surveyor.

Drainage area.—1,060 square miles.

Gage.—Recording hydrograph 30 feet downstream from the cable, in a concrete well 3 feet square, inside dimensions. The bottom of the well is about 2 feet below low water and 12 feet below ground surface. It is connected with the river by a 4-inch cast-iron water pipe 48 feet long, its intake end pointing downstream and protected by a fine wire screen. Inside the well and securely bolted to the side is a staff gage, its zero at elevation 573.36 and referred to a United States Geological Survey aluminum tablet set in the foundation wall of the Union Bag & Paper Co.'s mill at Hadley. On top of the well is a concrete shelter 6 feet high and 3 feet square, inside dimensions, for protecting the recording gage. The staff gage is used only as a reference gage.

Channel.—Very rough but permanent. The channel at the cable was cleared of bowlders as far as feasible, so that fairly accurate discharge measurements can be made at medium and high stages. Low-water measurements are made at a section about three-fourths of a mile above the cable, where the bottom is smooth and gravelly.

Discharge measurements.—At medium and high stages, made from cable; at low stages, made from a boat or by wading at a section about three-fourths of a mile above the cable.

Winter flow.—The water in the well and in the intake pipe never freezes because its level is below the frost line. The relation of gage height to discharge is, however, considerably affected by ice in the river.

Accuracy.—The discharge rating curve which has been developed for this station is well defined.

Discharge measurements of Sacandaga River at Hadley, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 18[a]	G. H. Canfield	5.08	774	Mar. 29[d]	Frank Weber	5.22	2,440
21[b]	Frank Weber	5.40	1,010	June 20	G. H. Canfield	3.28	530
Feb. 7[b]	.....do	4.43	580	July 3	.....do	2.69	195
28[c]	Alexander McMillan	4.11	650	5	.....do	2.76	229
Mar. 8[c]	Frank Weber	3.62	537	17	O. W. Hartwell	2.80	275
15[c]	.....do	4.18	775	Aug. 2[e]	J. G. Mathers	2.40	104
22[d]	.....do	6.16	3,710				

[a] Made at boat section ¾ mile above cable under partial ice cover.
[b] Made at highway bridge below cable under partial ice cover.
[c] Made at boat section under complete ice cover.
[d] Made from cable, partial ice cover.
[e] Made by wading about ½ mile above gage.

Daily gage height, in feet, of Sacandaga River at Hadley, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.2	4.4	4.2	7.1	6.2	5.3	2.78	2.37	2.60	3.7	4.7	3.95
2	4.9	4.4	4.15	7.4	5.9	5.1	2.73	2.42	2.60	3.65	4.6	4.1
3	4.6	4.5	4.1	7.4	5.7	4.9	2.70	2.54	2.64	3.65	4.7	5.6
4	4.45	4.45	4.05	7.3	5.5	4.7	2.70	2.52	3.00	3.65	4.6	6.1
5	4.4	4.5	3.85	7.4	5.4	4.5	2.77	2.53	3.15	3.55	4.4	6.1
6	4.2	4.4	3.9	7.3	5.1	4.35	2.72	2.53	3.10	3.5	4.25	6.1
7	4.1	4.45	3.75	7.8	5.2	4.25	2.67	2.51	3.05	3.4	4.4	6.1
8	4.05	4.45	3.65	8.4	5.3	4.2	2.66	2.48	2.98	3.3	5.9	6.0
9	4.05	4.4	3.7	9.0	5.2	4.05	2.67	2.47	2.92	3.2	6.6	5.8
10	4.0	4.45	3.8	8.5	5.0	3.9	2.68	2.59	2.87	3.2	6.7	5.4
11	4.3	......	3.9	7.8	4.9	3.8	2.65	2.73	2.85	3.2	6.5	5.3
12	4.6	......	3.7	7.2	4.9	3.7	2.62	2.84	2.81	3.3	6.2	5.0
13	5.0	4.5	3.8	6.8	4.7	3.6	2.59	2.86	2.80	3.4	5.9	4.4
14	5.2	4.4	4.05	6.7	5.0	3.5	2.70	2.79	2.80	3.4	5.7	4.3
15	5.1	4.3	4.2	6.7	5.0	3.5	2.75	2.69	2.82	3.45	5.6	4.3
16	5.0	4.15	5.4	7.0	5.0	3.45	2.80	2.68	3.10	3.45	5.4	4.8
17	5.1	3.95	6.1	7.6	5.4	3.4	2.80	2.59	3.45	3.4	5.2	4.2
18	5.1	3.8	6.2	8.4	5.7	3.4	2.75	2.61	3.45	3.35	5.0	4.15
19	4.9	3.75	6.4	8.7	5.8	3.35	2.70	2.63	3.55	3.3	4.9	4.4
20	5.0	3.75	6.4	8.7	5.6	3.25	2.64	2.63	3.75	3.4	4.7	4.9
21	5.3	3.8	6.3	8.3	5.8	3.2	2.64	2.62	3.65	3.7	4.6	5.0
22	5.4	4.1	6.3	7.9	6.3	3.15	2.71	2.63	3.55	3.7	4.5	4.8
23	......	4.6	6.1	7.8	6.6	3.1	2.80	2.65	3.45	3.8	4.4	4.6
24	......	4.5	5.9	8.0	6.6	......	2.86	2.67	3.4	5.1	4.3	4.4
25	......	4.4	5.7	8.0	6.4	......	2.75	2.71	3.5	6.1	4.35	4.2
26	......	4.25	5.5	7.6	6.3	......	2.62	2.73	4.1	6.4	4.4	4.1
27	......	4.2	5.2	7.3	6.0	......	2.62	2.74	4.2	6.4	4.35	4.05
28	4.9	4.2	5.0	7.0	5.7	......	2.59	2.71	4.0	6.1	4.25	4.05
29	4.6	4.2	5.4	6.8	5.4	2.82	2.57	2.69	3.85	5.7	4.05	4.05
30	4.45	......	6.2	6.4	5.5	2.80	2.55	2.69	3.7	5.3	4.0	4.1
31	4.4	......	6.7	......	5.5	......	2.48	2.66	......	5.0	......	4.35

NOTE.—Relation of gage height to discharge affected by ice Jan. 9 to Apr. 3. On days having little fluctuation in stage the mean gage height was obtained by an inspection of the hydrograph traced by the gage; on days when the fluctuation was considerable the mean gage height is the average of 6 readings during each 24-hour period.

Daily discharge, in second-feet, of Sacandaga River at Hadley, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,890	580	750	7,470	5,080	3,090	254	95	176	864	2,050	1,110
2	2,370	580	722	8,430	4,360	2,710	232	111	176	821	1,900	1,270
3	1,900	600	695	8,430	3,900	2,370	218	153	193	821	2,050	3,680
4	1,700	590	670	8,180	3,470	2,050	218	146	366	821	1,900	4,840
5	1,630	600	580	8,480	3,270	1,760	250	149	455	738	1,630	4,840
6	1,380	580	600	8,180	2,710	1,570	227	149	424	698	1,440	4,840
7	1,270	590	545	9,680	2,890	1,440	205	142	395	622	1,630	4,840
8	1,220	590	518	11,500	3,080	1,380	201	131	355	552	4,360	4,600
9	1,220	580	530	13,300	2,890	1,220	205	128	323	486	6,120	4,130
10	1,000	590	560	11,800	2,540	1,060	210	172	297	486	6,400	3,270
11	920	593	600	9,680	2,370	956	197	232	288	486	5,850	3,080
12	840	597	530	7,880	2,370	864	184	283	268	552	5,080	2,540
13	750	600	560	6,690	2,050	778	172	292	263	622	4,360	1,630
14	850	580	670	6,400	2,540	698	218	258	263	622	3,900	1,500
15	795	565	750	6,400	2,540	698	240	214	273	660	3,680	1,500
16	750	722	2,160	7,280	2,540	660	263	210	424	660	3,270	1,500
17	795	622	3,540	9,080	3,270	622	263	172	660	622	2,890	1,380
18	795	560	3,760	11,500	3,900	622	240	180	660	587	2,540	1,330
19	710	545	4,200	12,400	4,130	587	218	189	738	552	2,370	1,630
20	750	545	4,200	12,400	3,680	519	193	189	910	622	2,050	2,370
21	915	560	3,980	11,200	4,130	486	193	184	821	864	1,900	2,540
22	990	695	3,970	9,980	5,330	455	222	189	738	864	1,760	2,210
23	943	1,060	3,650	9,680	6,120	424	263	197	660	956	1,630	1,900
24	897	960	3,350	10,300	6,120	395	292	205	622	2,710	1,500	1,630
25	850	880	3,050	10,300	5,590	366	240	222	698	4,840	1,570	1,380
26	803	780	2,770	9,080	5,330	339	184	232	1,270	5,590	1,630	1,270
27	756	750	2,360	8,180	4,600	312	184	236	1,380	5,590	1,570	1,220
28	710	750	2,100	7,280	3,900	297	172	222	1,160	4,840	1,440	1,220
29	620	750	2,760	6,690	3,270	273	165	214	1,010	3,900	1,220	1,220
30	590	......	4,760	5,590	3,470	263	157	214	864	3,080	1,160	1,270
31	580	......	6,220	......	3,470	......	131	201	......	2,540	......	1,570

NOTE.—Daily discharge Jan. 1-9 and Apr. 4 to Dec. 31 determined from a fairly well defined rating curve. Daily discharge Jan. 10 to Apr. 3 estimated by means of numerous discharge measurements made during the period, climatologic records, and observer's notes.

Monthly discharge of Sacandaga River at Hadley, N. Y., for 1912.

[Drainage area, 1,060 square miles.]

Month.	Maximum.				Minimum.	Mean.	Per square mile.	Run-off (depth in inches).	Accuracy.
	Day.	Hour.	Gage height.	Discharge.					
			Feet.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*		
January	22	12 m.	5.44	[a]3,140	[b]580	1,070	1.01	1.16	B.
February	12	4 p. m.	4.80	[c]1,150	[b]545	655	.618	.67	B.
March	31	11.50 p.m	6.92	[d]6,900	[b]518	2,130	2.01	2.32	B.
April	9	10 a. m.	9.05	13,400	5,590	9,110	8.59	9.58	A.
May	24	2 a. m.	6.61	6,150	2,050	3,710	3.50	4.04	A.
June	1	12 m.	5.40	3,270	263	975	.920	1.03	A.
July	24	10 a. m.	2.88	302	131	213	.201	.23	A.
August	13	6 a. m.	2.88	302	95	191	.180	.21	A.
September	26	10 p. m.	4.28	1,480	176	571	.539	.60	A.
October	26	9 a. m.	6.41	5,620	486	1,570	1.48	1.71	A.
November	9	10. p. m.	6.75	6,540	1,160	2,700	2.55	2.84	A.
December	5	2 a. m.	6.15	4,960	1,110	2,360	2.23	2.57	A.
The year	Apr. 9	10 a. m.	9 05	13,400	95	2,100	1.98	26.96	

[a] Occurred Jan. 1, 12.15 a. m. Open water.
[b] From ice curves. Accuracy "D."
[c] Occurred Feb. 23, 10 a. m. Ice conditions. Accuracy "D."
[d] Occurred Mar. 20, 10 a. m. Ice conditions. Accuracy "D."

WEST BRANCH OF SACANDAGA RIVER AT BLACKBRIDGE, NEAR WELLS, N. Y.

Location.—On the highway bridge known as Blackbridge, about 3 miles west of Wells and 2 miles above the junction of the East and West branches of Sacandaga River. Replaces station formerly located at Whitehouse.

Records available.—March 14, 1911, to December 31, 1912.

Drainage area.—211 square miles.

Gage.—Chain, attached to upstream side of the highway bridge; read twice daily; datum unchanged.

Channel.—Rocky and practically permanent; two channels at extreme high water.

Discharge measurements.—Made from the bridge and by wading. Section beneath the bridge was cleared of bowlders in September, 1911.

Artificial control.—Gage heights slightly affected by storage dams used for logging in the spring.

Winter flow.—Probably little affected by ice. Stream open during greater part of the winter.

Accuracy.—The open-water rating curve is very well defined. Estimates for this period are good.

Discharge measurements of West Branch of Sacandaga River at Blackbridge, near Wells, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 4	C. S. De Golyer	5.24	1,040	Aug. 7[a]	J. G. Mathers	2.85	40.6
6	do	6.04	1,870	7[a]	do	2.85	41.4
8	do	6.60	2,800	Sept. 13[b]	G. H. Canfield	3.02	61.1
9	do	6.50	2,580				

[a] Wading 20 feet below regular section.
[b] Wading at regular section.

Daily gage height, in feet, of West Branch of Sacandaga River at Blackbridge, near Wells, N. Y., for 1912.

[Cornelius De Groff, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.75	7.2	......	5.7	5.6	7.1	2.84	2.80	2.84	3.65	4.4	3.8
2	4.8	7.4	......	5.8	5.35	5.35	2.80	2.80	3.11	3.85	4.5	3.85
3	4.6	7.1	......	5.5	5.1	4.55	2.80	2.88	3.35	3.9	4.3	5.8
4	4.5	......	......	5.35	5.1	4.75	2.81	2.88	3.32	3.8	4.2	5.8
5	4.3	......	......	5.3	4.8	4.4	2.81	2.80	3.32	3.8	4.1	5.6
6	4.3	......	......	6.0	6.2	4.3	2.82	2.80	3.20	3.7	4.05	5.6
7	4.25	......	......	7.1	4.75	4.15	2.82	2.82	3.15	3.7	4.65	5.6
8	4.05	......	......	6.8	4.8	4.1	2.82	2.80	3.31	3.55	6.6	5.3
9	3.9	......	......	6.5	4.65	3.9	2.82	2.80	3.25	3.55	6.1	5.15
10	3.85	......	......	6.2	4.5	3.8	2.80	2.80	2.95	3.5	5.9	4.95
11	3.95	......	......	5.9	5.15	3.75	2.90	2.82	2.94	3.6	......	4.9
12	3.75	......	......	5.6	4.85	3.65	2.90	2.82	3.35	3.7	5.6	4.75
13	3.7	......	......	5.4	4.95	3.55	2.90	2.82	3.10	3.75	5.4	4.5
14	3.6	......	......	5.8	5.15	3.5	3.15	2.82	2.95	3.7	5.3	4.25
15	3.85	......	......	6.1	5.15	3.42	2.91	2.82	2.94	3.6	5.15	4.3
16	3.75	......	......	7.2	5.3	3.45	2.91	2.82	3.85	3.55	5.0	4.2
17	3.6	......	......	7.3	5.7	3.46	2.90	2.81	3.65	3.5	4.9	4.3
18	3.45	......	......	7.5	5.6	3.40	2.90	2.84	3.41	3.55	4.8	4.1
19	3.85	......	......	7.4	5.3	3.30	2.84	2.80	3.65	3.5	4.7	4.7
20	4.55	......	......	6.9	5.6	3.25	2.85	2.80	3.7	5.6	4.65	4.75
21	4.85	......	......	6.9	6.4	3.20	2.84	2.84	3.5	4.1	4.5	4.8
22	5.2	......	......	7.1	6.4	3.12	2.34	2.84	3.42	4.1	4.4	4.6
23	5.2	......	......	7.0	5.6	3.10	2.32	2.82	3.45	4.05	4.3	4.5
24	5.2	......	......	6.5	5.9	3.05	2.91	2.85	3.7	3.55	4.3	4.4
25	5.45	......	......	6.4	5.7	3.00	2.90	2.80	4.2	5.8	4.2	4.3
26	......	......	......	6.4	5.4	3.00	2.86	2.85	4.5	5.4	4.1	4.15
27	......	......	......	6.4	5.2	2.90	2.82	2.55	4.3	5.3	4.3	4.25
28	......	......	......	6.1	5.1	2.92	2.82	2.86	4.0	5.1	4.05	4.0
29	......	......	......	5.9	5.0	2.90	2.80	2.85	3.9	4.95	3.9	3.95
30	......	......	......	5.8	4.9	2.90	2.80	2.80	3.85	4.8	3.85	4.05
31	......	......	5.7	......	6.0	......	2.88	2.80	......	4.5	......	4.7

NOTE.—Relation of gage height to discharge affected by ice Jan. 20 to Mar. 31, 1912.

Daily discharge, in second-feet, of West Branch of Sacandaga River at Blackbridge, near Wells, N. Y., for 1911–12.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.									
1	735	2,760	464	189	51	152	189	439	667
2	634	4,380	326	189	46	96	218	490	604
3	545	2,270	306	176	41	134	251	464	490
4	573	2,120	218	163	45	106	464	391	439
5	573	1,980	414	152	40	86	604	439	439
6	735	1,380	306	140	204	251	517	347	391
7	1,490	886	517	140	124	269	414	545	326
8	1,490	1,050	439	140	66	347	73	1,010	326
9	1,140	490	306	136	104	414	517	968	368
10	1,050	418	326	128	80	414	545	968	517
11	926	347	287	120	57	391	490	886	667
12	1,090	368	234	116	53	287	391	926	1,600
13	1,280	545	634	113	41	251	326	1,050	2,420
14	1,850	735	1,230	106	31	234	79	968	1,380
15	1,980	464	735	97	22	251	490	2,580	1,600
16	1,990	464	735	124	136	218	218	545	1,380
17	1,850	1,380	545	132	111	176	204	2,120	1,380
18	1,720	604	464	120	52	140	517	926	1,380
19	1,720	700	391	91	42	120	391	1,180	1,050
20	1,600	1,010	306	83	57	105	1,010	968	1,010
21	1,850	667	234	69	51	92	1,010	886	808
22	1,720	700	218	52	44	84	1,000	545	667
23	1,600	1,010	204	69	38	78	1,490	439	3,120
24	1,600	846	176	96	34	69	1,180	634	1,380
25	1,490	886	163	120	30	72	439	545	1,230
26	2,420	846	152	89	38	72	926	391	1,280
27	2,940	414	163	78	46	72	886	391	1,380
28	4,200	326	204	69	78	72	604	391	604
29	4,200	326	163	61	347	163	517	604	808
30	3,660	326	189	53	251	218	414	700	667
31	......	347	......	56	176	......	251	......	808

Daily discharge, in second-feet, of West Branch of Sacandaga River at Blackbridge, near Wells, N. Y., for 1911–12—Continued.

Day.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.										
1	667	1,490	1,380	3,660	40	36	40	176	464	218
2	700	1,600	1,140	1,140	36	36	73	234	517	234
3	573	1,280	926	545	36	44	111	251	414	1,600
4	517	1,140	926	667	37	44	106	218	368	1,600
5	414	1,090	700	464	37	36	106	218	326	1,380
6	414	1,850	2,120	414	38	36	86	189	306	1,380
7	391	3,660	667	347	38	38	79	189	604	1,380
8	306	3,120	700	326	38	36	104	152	2,760	1,090
9	251	2,580	604	251	38	36	94	152	1,980	968
10	234	2,120	517	218	36	36	52	140	1,720	808
11	269	1,720	968	204	46	38	51	163	1,550	770
12	204	1,380	735	176	46	38	111	189	1,380	667
13	189	1,180	808	152	46	38	72	204	1,180	517
14	163	1,600	886	140	79	38	52	189	1,090	391
15	234	1,980	886	124	47	38	51	163	968	414
16	204	3,840	1,090	130	47	38	234	152	846	368
17	163	4,020	1,490	132	46	37	176	140	770	414
18	130	4,380	1,380	120	46	40	122	152	700	326
19	234	4,200	1,090	102	40	36	176	140	634	634
20	....	3,300	1,380	94	41	36	189	1,380	604	667
21	....	3,300	2,420	86	40	40	140	326	517	700
22	....	3,660	2,420	75	5	40	124	326	464	573
23	....	3,480	1,380	72	4	38	130	306	414	517
24	....	2,580	1,720	65	47	41	189	152	414	464
25	....	2,420	1,490	58	46	36	368	1,600	368	414
26	....	2,420	1,180	58	42	41	517	1,180	326	347
27	....	2,420	1,010	46	38	15	414	1,090	414	391
28	....	1,980	926	48	38	42	287	926	306	287
29	....	1,720	846	46	36	41	251	808	251	269
30	....	1,600	770	46	36	36	234	700	234	306
31	....	....	1,850	....	44	36	....	517	....	634

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge on days for which no gage heights are given estimated from the discharge at Hope.

Monthly discharge of West Branch of Sacandaga River at Blackbridge, near Wells, N. Y., for 1911–12.

[Drainage area 211 square miles.]

Month	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
April	4,200	545	1,690	8.01	8.94	A.
May	4,380	326	1,000	4.74	5.46	A.
June	1,230	152	368	1.74	1.94	A.
July	189	52	112	.531	.61	A.
August	347	30	81.8	.388	.45	A.
September	414	69	181	.858	.96	A.
October	1,490	73	536	2.54	2.93	A.
November	2,580	347	791	3.75	4.18	A.
December	3,120	326	1,010	4.79	5.52	A.
1912.						
January	....	....	250	1.18	1.36	D.
February	....	....	130	.616	.66	D.
March	....	....	400	1.90	2.19	D.
April	4,380	1,090	2,440	11.6	12.94	A.
May	2,420	517	1,170	5.55	6.40	A.
June	3,660	46	334	1.58	1.76	A.
July	79	4	39.8	.189	.22	A.
August	44	15	37.5	.178	.21	A.
September	517	40	158	.749	.84	A.
October	1,600	140	410	1.94	2.24	A.
November	2,760	234	763	3.62	4.04	A.
December	1,600	218	669	3.17	3.66	A.
The year	4,380	4	565	2.68	36.52	

NOTE.—Discharge Jan. 20 to Mar. 31 estimated by comparison with the discharge at Hadley. Mean discharge Jan. 20–31 estimated 125 second-feet.

HOOSIC RIVER NEAR EAGLE BRIDGE, N. Y.

Location.—1½ miles above the village of Eagle Bridge and ½ mile below the mouth of Walloomsac River coming in from the right. Owlkill Creek enters from the right at Eagle Bridge. Replaces station formerly maintained at Buskirk. The Buskirk station was abandoned because the relation between gage height and discharge was affected by backwater caused by the construction of a dam at Johnsonville.

Records available.—August 13, 1910, to December 31, 1912. For the station formerly maintained at Buskirk, 4 miles below, records are available from September 25, 1903, to December 31, 1908. Data published also in annual reports of New York State engineer and surveyor.

Drainage area.—512 square miles.

Gage.—Standard chain, supported by cantilever arm on a tree on the left bank about 400 feet above the residence of James Russell. Datum unchanged.

Channel.—Bed of river composed of gravel; liable to shift. Control point about 400 feet below the gage.

Discharge measurements.—At low stages made by wading; at high stages formerly made from the highway bridge in the village of Eagle Bridge, 1½ miles below. A cable was erected at this station during 1912, ½ mile below the gage for high-water measurements.

Artificial control.—The dam of Walter A. Wood & Co. is located at Hoosic Falls, about 2 miles above the gage. Walloomsac River is also partly controlled, and the effect of the operation of the mills is observable at the gage. On this account the gage heights should be used with caution.

Accuracy.—Except for possible inaccuracies in gage heights due to artificial control records are good.

Discharge measurements of Hoosic River near Eagle Bridge, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 27[a]	C. S. De Golyer	9.52	684
Mar. 1[a]	....do	8.28	241
14	Alexander McMillan	9.80	1,850
16	C. S. De Golyer	12.33	4,950
17	....do	10.28	8,320

[a] Measurements made under complete ice cover.

Daily gage height, in feet, of Hoosic River near Eagle Bridge, N. Y., for 1912.

[Vashti Russell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.7	8.0	8.55	11.1	9.2	9.9	7.5	7.0	6.92	7.48	8.35	8.0
2	8.7	8.1	8.3	11.7	9.0	9.4	7.32	7.25	7.00	7.40	8.4	8.1
3	8.5	8.1	8.45	11.6	8.8	11.8	7.30	7.02	7.30	7.30	8.3	10.7
4	8.4	8.0	8.5	10.5	8.6	10.2	7.05	7.05	7.45	7.20	8.2	9.6
5	8.2	8.5	8.4	10.8	8.6	9.8	7.25	7.30	7.35	7.18	8.0	9.0
6	8.1	8.55	8.4	11.4	9.0	9.4	7.30	7.22	7.32	7.05	8.0	9.6
7	7.9	8.3	8.45	12.5	9.2	9.9	7.02	7.12	7.20	7.00	8.0	9.7
8	8.0	8.2	9.1	......	8.8	9.2	7.35	6.98	7.00	7.32	10.8	9.1
9	8.3	8.45	10.7	11.3	8.8	9.0	7.22	6.98	7.25	7.02	9.5	8.9
10	8.3	8.75	9.4	10.9	9.3	8.8	7.20	6.85	7.20	7.15	9.0	8.8
11	8.4	8.75	9.2	10.5	8.8	8.6	7.15	6.98	7.25	7.35	8.8	8.7
12	8.7	8.85	9.0	10.1	8.6	8.4	7.40	7.5	7.20	7.45	8.7	8.6
13	8.6	8.85	......	10.0	8.8	8.3	7.00	7.08	7.22	7.25	8.4	8.35
14	8.4	8.8	9.9	10.3	8.9	8.15	7.00	6.92	7.08	7.50	9.1	8.3
15	8.5	8.65	9.8	10.5	8.8	8.1	7.30	7.00	6.95	7.40	9.4	8.2
16	8.6	8.4	12.4	11.4	8.8	8.0	7.18	7.02	7.7	7.25	9.0	8.3
17	8.6	8.35	10.5	11.6	10.6	8.2	7.30	6.75	7.6	7.15	8.7	8.1
18	8.4	8.25	10.6	10.9	9.8	8.0	7.25	6.90	7.32	7.12	8.6	8.1
19	9.4	8.35	10.6	10.8	9.3	7.9	7.8	7.05	7.28	7.55	8.4	8.8
20	9.8	8.55	10.8	10.3	9.2	7.9	7.40	7.00	7.65	7.38	8.3	9.1
21	9.2	9.0	10.0	9.9	9.2	7.7	7.08	7.00	7.22	7.28	8.3	8.45
22	9.1	10.6	9.6	9.9	9.8	7.8	7.38	7.10	7.10	7.25	8.25	8.2
23	8.6	9.4	9.0	10.4	9.2	7.42	7.28	7.18	7.32	7.42	8.2	8.3
24	8.6	8.9	9.0	10.0	9.0	7.6	7.20	7.7	7.22	......	8.0	8.2
25	8.2	9.6	8.9	10.0	9.3	7.6	7.20	7.20	7.12	11.6	8.8	7.9
26	8.3	10.2	8.6	9.6	9.0	7.48	7.25	7.40	7.12	10.2	8.45	8.25
27	8.2	9.4	8.6	9.5	8.8	7.42	7.25	7.10	7.15	9.5	8.25	8.3
28	8.2	9.1	8.7	9.2	8.6	7.48	6.95	7.32	7.12	9.2	8.05	8.35
29	8.2	8.7	11.5	9.1	8.4	7.30	6.95	6.95	7.02	8.8	8.15	8.25
30	8.2	......	11.8	9.4	11.4	7.05	7.25	7.08	7.18	8.6	8.1	8.6
31	8.0	......	10.4	......	10.7	......	7.25	7.02	......	8.4	......	10.8

NOTE.—Relation of gage height to discharge affected by ice Jan. 8 to Mar. 15.

Daily discharge, in second-feet, of Hoosic River near Eagle Bridge, N. Y., for 1910–1912.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.											
1	......	116	152	116	310	16	140	195	105	425	880
2	......	112	84	112	238	17	140	195	128	400	880
3	......	128	128	230	290	18	152	135	128	332	680
4	......	128	140	950	212	19	180	152	116	355	620
5	......	128	128	880	270	20	105	180	128	310	745
6	......	270	152	745	270	21	75	160	105	310	745
7	......	1,400	142	532	270	22	140	121	84	290	620
8	......	532	135	400	290	23	128	105	135	378	560
9	......	310	116	355	290	24	105	94	128	223	1,090
10	......	262	195	400	290	25	152	84	140	290	2,990
11	......	195	152	532	290	26	105	140	165	310	1,730
12	......	230	128	290	310	27	94	195	152	195	1,640
13	223	212	171	310	478	28	75	212	165	378	1,400
14	94	165	128	450	778	29	105	212	250	355	1,560
15	145	212	105	450	680	30	90	140	165	223	2,890
						31	116	......	165	......	1,730

Daily discharge, in second-feet, of Hoosic River near Eagle Bridge, N. Y., for 1910–1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	......	778	......	1,400	1,480	355	174	189	250	620	1,240	1,320
2	......	650	......	950	2,670	332	212	165	250	880	950	1,160
3	5,040	532	......	950	1,730	332	195	145	174	810	950	950
4	3,340	745	......	950	1,400	195	165	152	195	880	810	950
5	1,560	810	......	1,560	1,090	332	160	88	165	1,640	745	745
6	1,400	532	......	3,220	1,020	378	152	94	270	1,020	810	778
7	1,400	532	......	4,720	810	478	171	180	478	1,240	1,020	778
8	1,090	620	......	2,880	810	450	180	189	620	1,160	1,090	778
9	......	532	......	2,470	745	355	105	180	332	1,020	880	778
10	......	560	......	2,090	650	270	160	116	1,910	880	845	712
11	......	505	......	1,730	590	212	212	160	950	745	810	745
12	......	532	......	1,730	560	400	116	88	745	680	680	880
13	......	505	......	1,730	620	1,820	160	91	505	680	1,640	950
14	......	......	......	2,470	590	1,820	135	68	450	505	1,090	810
15	......	......	2,470	4,720	650	1,090	75	88	378	478	1,090	810
16	......	......	1,090	3,100	532	880	79	116	532	532	1,090	1,160
17	......	......	650	2,280	478	778	180	152	532	505	880	1,480
18	......	......	650	1,730	450	560	171	145	450	532	1,640	1,480
19	......	......	560	1,730	505	532	148	189	478	5,040	2,000	1,240
20	......	......	680	1,560	950	560	160	128	400	2,880	1,480	950
21	......	......	560	1,480	590	425	128	140	378	2,000	1,400	880
22	......	......	745	1,560	505	425	140	84	310	2,990	1,240	950
23	......	......	1,730	1,400	450	355	94	94	378	3,840	1,020	3,840
24	......	......	880	1,240	378	332	160	128	355	2,670	1,160	2,470
25	......	......	650	1,480	400	222	355	81	378	1,910	1,320	1,910
26	......	......	810	1,730	425	332	195	105	298	1,560	950	1,730
27	......	......	3,580	1,730	332	355	171	152	310	1,400	1,090	1,910
28	......	......	6,000	1,910	310	355	140	230	332	1,240	1,020	1,640
29	1,400	......	2,090	1,730	310	310	230	1,240	355	1,090	2,280	1,090
30	1,400	......	3,710	1,560	212	302	171	745	620	1,020	1,560	1,020
31	590	......	1,910	......	270	......	195	425	......	950	......	950
1912.												
1	1,020	......	......	3,220	1,400	2,000	310	140	121	302	778	560
2	1,020	......	......	3,980	1,240	1,560	238	212	140	270	810	620
3	880	......	......	3,840	1,090	4,120	230	145	230	230	745	2,780
4	810	......	......	2,570	950	2,280	152	152	290	195	680	1,730
5	680	......	......	2,880	950	1,910	212	230	250	189	560	1,240
6	620	......	......	3,580	1,240	1,560	230	202	238	152	560	1,730
7	505	......	......	5,200	1,400	2,000	145	171	195	140	560	1,820
8	......	......	......	5,600	1,090	1,400	250	135	140	238	2,880	1,320
9	......	......	......	3,460	1,090	1,240	202	135	212	145	1,640	1,160
10	......	......	......	2,990	1,480	1,090	195	105	195	180	1,240	1,090
11	......	......	......	2,570	1,090	950	180	135	212	250	1,090	1,020
12	......	......	......	2,180	950	810	270	310	195	290	1,020	950
13	......	......	......	2,090	1,090	745	140	160	202	212	810	778
14	......	......	......	2,380	1,160	650	140	121	160	310	1,320	745
15	......	......	......	2,570	1,090	620	230	140	128	270	1,560	680
16	......	......	5,040	3,580	1,090	560	189	145	400	212	1,240	745
17	......	......	2,570	3,840	2,670	680	230	84	355	180	1,020	620
18	......	......	2,670	2,990	1,910	560	212	116	238	171	950	620
19	......	......	2,670	2,880	1,480	505	450	152	223	332	810	1,090
20	......	......	2,880	2,380	1,400	505	270	140	378	262	745	1,320
21	......	......	2,090	2,000	1,400	400	160	140	202	223	745	845
22	......	......	1,730	2,000	1,910	450	262	165	165	212	712	680
23	......	......	1,240	2,470	1,400	278	223	189	238	278	680	745
24	......	......	1,240	2,090	1,240	355	195	400	202	5,500	560	680
25	......	......	1,160	2,090	1,480	355	195	195	171	3,840	1,090	505
26	......	......	950	1,730	1,240	302	212	270	171	2,280	845	712
27	......	......	950	1,640	1,090	278	212	165	180	1,640	712	745
28	......	......	1,020	1,400	950	302	128	238	171	1,400	590	778
29	......	......	3,710	1,320	810	230	128	128	145	1,090	650	712
30	......	......	4,120	1,560	3,580	152	212	160	189	950	620	950
31	......	......	2,470	......	2,780	......	212	145	......	810	......	2,880

NOTE.—Daily discharge determined from a fairly well defined rating curve. On April 8 and Oct, 24 the water was so high that the observer could not get to the gage. This was at least gage height 13 feet. Discharge estimated for these days.

Monthly discharge of Hoosic River near Eagle Bridge, N. Y., for 1910–1912.

[Drainage area, 512 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910.						
August 13–31	223	75	124	0.242	0.17	B.
September	1,400	84	224	.438	.49	B.
October	250	84	139	.271	.31	B.
November	950	112	384	.750	.84	B.
December	2,990	212	839	1.64	1.89	A.
1911.						
January			1,000	1.95	2.25	C.
February			512	1.00	1.04	C.
March	6,000		1,060	2.07	2.39	C.
April	4,720	950	1,990	3.89	4.34	A.
May	2,670	212	726	1.42	1.64	A.
June	1,820	195	518	1.01	1.13	B.
July	355	75	164	.320	.37	B.
August	1,240	68	198	.387	.45	B.
September	1,910	165	459	.896	1.00	B.
October	5,040	478	1,400	2.73	3.15	A.
November	2,280	680	1,160	2.27	2.53	A.
December	3,840	712	1,220	2.38	2.74	A.
The year	6,000	68	869	1.70	23.03	
1912.						
January			570	1.11	1.28	C.
February			460	.898	.97	B.
March	5,040		1,510	2.95	3.40	B.
April	5,600	1,320	2,770	5.41	6.04	A.
May	3,580	810	1,410	2.75	3.17	A.
June	4,120	152	962	1.88	2.10	A.
July	450	128	213	.416	.48	B.
August	400	84	172	.336	.39	B.
September	400	121	211	.412	.46	B.
October	5,500	140	734	1.43	1.65	A.
November	2,880	560	941	1.84	2.05	A.
December	2,880	505	1,060	2.07	2.39	A.
The year	5,600	84	917	1.79	24.38	

NOTE.—Discharge Jan. 1 and 2, 9 to 28, and Feb. 14 to Mar. 14, 1911, estimated from climatological records and comparative run-off. Discharge Jan. 8 to Feb. 9, 1912, estimated from climatological records, observer's notes, and measurements made after this period; discharge Feb. 10, to Mar. 14, 1912, estimated from measurements made during the period: Jan. 1–2, 1911, 2,000 second-feet; Jan. 9–28, 1911, 490 second-feet; Feb. 14–28, 1911, 435 second-feet; Mar. 1–14, 1911, 505 second-feet; Jan. 8–31, 1912, 505 second-feet; Feb. 1–10, 1912, 400 second-feet.

MOHAWK RIVER AT LITTLE FALLS, N. Y.

Location.—At the lower (Gilbert's) dam in the city of Little Falls, N. Y.

Records available.—1898 to 1912. Data also in the report of the Board of Engineers on Deep Water Ways (1900) and the annual reports of the New York State engineer and surveyor.

Drainage area.—1,306 square miles.

Computations of discharge.—Records show the flow over a masonry dam and the run of the water wheels at the Astoranga Knitting Mill and the mill of the Little Falls Paper Co.

Diversion.—Water is diverted from Mohawk River above this station to feed the Erie Canal. The records at this point do not indicate the total run-off from the drainage area. They indicate the amount of water flowing in the river after it leaves Little Falls.

Cooperation.—Records obtained and furnished for publication under the direction of the New York State engineer and surveyor.

Daily discharge in second-feet of Mohawk River at Little Falls, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,537	1,437	2,056	15,312	5,041	2,857	898	673	[a]554	2,076	1,934	[a]1,499
2	2,821	1,283	1,990	14,103	5,457	[a]2,267	742	633	567	2,927	2,080	1,897
3	2,753	1,286	[a]1,501	10,866	4,828	2,993	717	769	975	2,739	[a]2,044	7,387
4	2,254	[a]954	1,730	9,579	4,321	2,759	435	[a]887	1,288	2,119	2,095	6,934
5	1,871	1,316	1,717	9,584	[a]3,559	2,269	873	1,128	1,273	1,854	1,844	4,686
6	1,363	1,318	1,518	11,308	3,896	1,993	728	904	1,505	[a]1,440	1,690	4,691
7	[a]915	1,248	1,448	[a]16,360	4,996	1,731	[a]401	775	1,754	1,696	1,759	5,750
8	1,401	1,136	1,931	17,991	3,888	1,640	693	843	[a]1,006	1,357	10,062	[a]4,592
9	1,528	1,090	2,593	12,856	3,449	[a]1,357	613	643	1,195	1,249	9,045	3,772
10	1,323	1,133	[a]2,558	9,224	2,861	1,982	419	642	961	1,301	[a]4,993	3,180
11	1,402	[a]828	2,252	7,993	2,396	1,579	386	[a]838	828	1,593	3,673	3,053
12	1,441	1,262	2,367	6,712	[a]1,607	1,483	438	975	937	1,952	2,643	2,640
13	1,330	1,169	2,253	7,152	1,994	1,387	238	829	996	[a]1,758	2,055	1,709
14	[a]1,297	1,135	1,488	[a]8,054	2,132	1,306	[a]696	902	812	2,411	2,848	2,239
15	1,706	1,320	1,866	10,663	1,705	1,451	994	738	[a]548	1,909	4,026	[a]2,114
16	1,528	1,185	4,127	12,928	1,610	[a]1,130	1,020	738	1,688	1,437	3,173	3,053
17	1,568	1,168	[a]5,128	14,151	2,821	2,120	843	842	2,774	1,663	[a]2,402	2,870
18	1,529	[a]868	6,291	12,170	4,454	1,410	788	[a]435	1,774	2,417	2,143	2,938
19	1,564	1,281	8,234	11,965	[a]3,557	1,017	666	761	2,214	1,362	1,946	5,185
20	1,999	1,434	9,270	9,629	3,146	942	566	843	2,374	[a]2,550	2,244	5,997
21	[a]1,935	2,208	7,578	[a]6,939	5,301	720	[a]401	724	1,982	2,716	2,033	5,220
22	2,318	2,365	6,400	7,177	7,404	647	1,100	806	[a]1,406	1,768	1,822	[a]4,229
23	1,946	2,242	5,508	12,228	5,495	[a]372	1,128	789	1,681	1,607	1,928	3,587
24	1,758	2,188	[a]4,931	8,490	4,060	662	834	769	2,459	2,811	[a]1,449	2,478
25	1,607	[a]2,270	3,868	7,516	3,214	747	798	[a]617	4,676	5,924	2,583	2,580
26	1,525	2,365	3,011	6,350	[a]2,240	809	673	886	5,139	5,988	2,880	2,718
27	1,330	2,319	3,065	6,782	2,245	646	775	804	3,559	[a]4,062	2,768	2,660
28	[a]735	2,415	3,606	[a]7,180	1,345	373	[a]435	739	2,340	3,583	2,338	2,358
29	1,601	2,254	7,913	6,278	1,326	491	367	742	[a]1,563	2,825	2,099	[a]1,651
30	1,407	....	10,693	5,743	2,537	[a]574	645	639	2,052	2,403	2,028	1,945
31	1,289	....	[a]11,937	....	3,459	....	597	255	....	1,991	....	2,587

[a] Sunday.

Monthly discharge of Mohawk River at Little Falls, N. Y., for 1912.

Month.	Discharge in second-feet.			Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.		Maximum.	Minimum.	Mean.
January	2,821	735	1,664	August	1,128	255	760
February	2,415	828	1,534	September	5,139	548	1,763
March	11,937	1,448	4,220	October	5,988	1,249	2,371
April	17,991	5,743	10,109	November	10,062	1,449	2,888
May	7,404	1,326	3,430	December	7,387	1,499	3,490
June	2,993	372	1,390	The year	17,991	238	2,850
July	1,128	238	674				

MOHAWK RIVER AT TRIBES HILL, N. Y.

Location.—At the suspension bridge between the towns of Fort Hunter and Tribes Hill.

Records available.—April 3, 1904, to December 31, 1912. Data also in the annual reports of the New York State engineer and surveyor.

Drainage area.—3,113 square miles.

Gage.—Chain gage on bridge.

Channel.—Favorable for current-meter measurements.

Discharge measurements.—Made from the downstream side of the suspension bridge.

Cooperation.—Established and maintained by the New York State engineer and surveyor, who furnishes the records for publication.

Daily discharge, in second-feet, of Mohawk River at Tribes Hill, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7,000	550	1,520	36,800	14,100	6,825	1,775	1,120	[a]1,520	4,000	3,850	[a]3,420
2	7,800	550	1,120	(b)	13,800	[a]7,000	1,775	1,120	1,520	4,000	3,700	5,100
3	7,000	525	[a]1,120	33,600	11,850	7,000	1,775	1,300	1,520	4,300	[a]4,000	26,950
4	6,275	[a]525	1,120	26,950	9,600	7,000	1,775	[a]1,300	1,775	4,000	4,300	16,800
5	5,250	525	1,520	26,950	[a]8,875	5,925	1,775	1,300	2,162	3,700	4,300	14,100
6	4,600	520	1,520	36,800	9,600	5,250	1,648	1,300	2,575	[a]3,420	3,850	14,700
7	[a]4,300	520	2,025	(a b)	9,100	4,950	[a]1,410	1,300	2,850	3,125	3,700	16,800
8	4,000	520	2,025	(b)	8,250	4,600	1,300	1,300	[a]2,988	2,438	20,100	[a]14,100
9	3,700	515	2,025	41,250	6,825	[a]4,300	1,300	1,648	2,988	2,300	24,900	7,600
10	3,420	515	[a]2,025	30,100	6,100	3,700	1,300	1,520	2,575	2,162	[a]11,100	6,100
11	3,125	[a]515	2,025	27,800	5,925	3,700	1,300	[a]1,520	2,575	2,025	9,350	7,600
12	2,575	515	2,575	25,300	[a]5,600	3,850	1,300	1,648	2,300	2,300	7,600	7,600
13	2,300	515	5,600	22,300	5,250	3,700	1,300	2,162	2,025	[a]2,162	6,650	4,950
14	[a]2,300	510	10,600	[a]24,125	4,600	3,560	[a]1,300	2,575	2,025	2,300	7,800	4,450
15	2,025	510	17,500	28,700	4,600	3,700	1,520	2,438	[a]2,575	2,162	9,350	[a]4,775
16	2,025	510	46,000	39,300	4,950	[a]3,420	1,520	2,025	3,125	2,300	7,000	4,950
17	1,775	510	[a]25,700	43,700	8,250	3,420	1,520	1,775	5,925	2,300	[a]6,650	5,425
18	1,775	[a]510	26,100	38,650	12,650	3,420	1,520	[a]1,775	5,600	2,300	5,762	5,250
19	1,520	510	29,150	31,600	[a]11,100	3,420	1,520	1,775	3,700	2,575	5,250	6,100
20	1,520	510	36,800	30,600	9,100	3,125	1,520	2,025	4,600	[a]4,775	5,600	8,250
21	[a]1,300	525	30,600	[a]23,750	9,600	2,712	[a]1,520	2,162	5,600	5,925	5,425	8,875
22	1,120	630	14,700	24,500	11,600	2,438	1,520	2,162	[a]5,250	4,775	5,425	[a]8,650
23	1,120	630	16,200	27,375	10,850	[a]2,300	1,410	1,648	4,600	5,250	5,600	7,800
24	960	630	[a]14,400	29,600	10,050	2,300	1,410	1,300	4,600	10,325	[a]5,762	7,200
25	710	[a]630	11,100	24,500	8,875	2,162	1,520	[a]1,648	8,875	18,425	7,400	6,462
26	710	630	9,100	20,800	[a]7,400	2,025	1,520	1,775	11,850	17,500	7,000	5,425
27	630	1,520	7,200	16,800	7,200	1,900	1,520	1,775	9,600	[a]15,300	5,925	5,425
28	[a]630	1,520	13,250	[a]13,800	7,600	1,775	[a]1,520	1,775	6,650	10,325	5,250	5,600
29	630	1,520	26,100	15,300	7,400	1,775	1,410	1,520	[a]4,950	7,600	4,775	[a]6,422
30	575	....	(b)	16,800	7,000	[a]1,775	1,300	1,520	4,300	5,762	4,600	8,250
31	550	....	(a b)	....	6,025	....	1,120	1,520	....	4,000	....	10,850

[a] Sunday. [b] Beyond limits of rating curve.

Monthly discharge of Mohawk River at Tribes Hill, N. Y., for 1912.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
January	7,800	550	2,685
February	1,520	510	642
March	[a]46,000	1,120	12,439
April	[a]43,700	13,800	28,065
May	14,100	4,600	8,572
June	7,000	1,775	3,768
July	1,775	1,120	1,481
August	2,575	1,120	1,669
September	11,850	1,520	4,107
October	18,425	2,025	5,285
November	24,900	3,700	7,066
December	26,950	3,420	8,581
The year	[a]46,000	510	7,020

[a] Actual maximum beyond limits of rating curve.

WEST CANADA CREEK AT WILMURT, N. Y.

Location.—At the highway bridge in the town of Wilmurt, N. Y.

Records available.—June 28, 1909, to December 31, 1912. Data also in annual reports of the New York State engineer and surveyor.

Drainage area.—198 square miles.

Gage.—Enameled steel scale, attached to the planking on the right side of the center pier at the downstream side of the bridge. High-water gage attached to a telegraph pole near the Flansburgh residence.

Discharge measurements.—Made by wading below the bridge at low water and from the bridge at high water.

Cooperation.—Established and maintained by the New York State engineer and surveyor, who furnishes the records for publication.

Daily discharge, in second-feet, of West Canada Creek at Wilmurt, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	744	410	410	2,060	476	1,000	50	98	[a]383	916	1,685	[a]267
2	676	410	410	1,630	3,700	[a]820	50	98	476	1,050	1,870	2,420
3	600	410	[a]410	1,457	410	638	48	240	638	1,150	[a]1,685	(b)
4	476	[a]410	410	1,300	600	600	48	[a]356	600	916	1,457	2,270
5	476	410	410	1,457	[a]600	570	48	443	540	1,150	1,200	1,404
6	540	410	410	2,955	2,345	540	48	383	638	[a]916	1,510	1,300
7	[a]540	410	138	(ab)	1,570	540	[a]48	240	744	1,100	1,457	1,050
8	540	410	410	(b)	1,300	744	48	240	[a]676	1,300	1,805	[a]820
9	540	410	410	(b)	443	[a]916	48	190	570	1,100	2,955	676
10	540	410	[a]410	3,520	410	744	48	215	540	958	(a)[b]	744
11	540	[a]410	410	2,270	638	638	58	[a]383	476	916	(b)	676
12	540	410	410	1,404	[a]676	600	65	410	600	820	3,440	570
13	540	410	410	1,200	868	600	58	356	782	[a]820	2,710	508
14	[a]540	410	410	[a]2,345	820	820	[a]164	325	676	744	1,457	443
15	540	410	410	3,780	710	676	164	294	[a]710	744	1,200	[a]410
16	540	410	1,300	(b)	638	[a]570	118	240	958	710	1,100	410
17	540	410	[a]1,935	(b)	1,935	443	72	190	868	676	[a]916	410
18	476	[a]410	2,490	(b)	(b)	410	72	[a]215	782	744	744	410
19	476	476	3,200	(b)	(ab)	267	65	190	1,050	916	638	1,050
20	476	676	2,710	(b)	2,710	215	58	190	1,250	[a]1,100	570	1,250
21	[a]410	676	2,270	[a]2,270	(b)	190	[a]72	164	820	1,150	782	1,300
22	410	600	1,685	(b)	(b)	[a]138	190	138	[a]676	1,050	820	[a]1,050
23	410	540	1,200	(b)	(b)	85	138	190	820	1,457	476	958
24	410	476	[a]1,000	(b)	2,345	72	85	190	1,457	1,805	[a]383	782
25	410	[a]476	600	2,120	1,510	58	72	[a]240	2,345	2,420	294	570
26	410	476	410	3,440	[a]958	58	72	240	2,270	3,200	240	508
27	410	410	325	(b)	820	58	58	190	2,060	[a]3,700	240	410
28	[a]410	410	294	[a](b)	744	50	[a]58	240	1,570	3,200	240	476
29	410	410	710	(b)	744	50	50	240	[a]1,250	2,560	294	[a]443
30	410	....	2,060	(b)	782	[a]50	50	190	1,100	2,120	294	540
31	410	....	[a]1,740	....	1,200	....	50	294	....	1,630	....	1,250

[a] Sunday.

[b] Beyond limits of rating curve.

Monthly discharge of West Canada Creek at Wilmurt, N. Y., for 1912.

[Drainage area, 198 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	744	410	496	2.51	2.89
February	676	410	448	2.26	2.44
March	3,200	138	962	4.86	5.60
April (15 days)	[a]3,780	1,200	2,214	11.18	12.48
May (26 days)	[a]3,700	410	1,152	5.82	6.71
June	1,000	50	439	2.22	2.48
July	190	48	73	.369	.426
August	443	98	246	1.24	1.43
September	2,345	383	944	4.76	5.31
October	3,700	676	1,388	7.01	8.08
November (28 days)	[a]3,440	240	1,159	5.85	6.53
December (30 days)	[a]2,420	267	846	4.27	4.92

[a] Actual maximum beyond limits of rating curve.

WEST CANADA CREEK AT EAST BRIDGE, N. Y.

Location.—On the highway bridge about 4 miles above the mouth and about 3 miles above the village of Herkimer.

Records available.—May 15, 1905, to December 31, 1912. Data also in the annual reports of the New York State engineer and surveyor.

Drainage area.—575 square miles.

Gage.—Horton tape gage on bridge, near east abutment.

Channel.—Favorable for good meter measurements.

Discharge measurements.—Made from bridge.

Cooperation.—Records furnished by the New York State engineer and surveyor.

Daily discharge, in second-feet, of West Canada Creek at Kast Bridge, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,274	1,324	1,385	6,280	2,970	1,735	194	295	a200	1,120	916	a634
2	1,140	1,274	1,490	5,864	2,602	a1,630	248	271	243	1,910	1,350	811
3	1,070	1,274	a1,299	3,560	2,602	1,490	257	351	248	1,197	a1,420	7,021
4	789	a1,420	1,350	2,740	2,372	1,248	280	a409	267	1,095	1,095	5,340
5	577	1,420	1,222	3,746	a2,234	1,070	299	442	636	1,095	1,018	3,206
6	475	1,197	1,197	7,276	2,418	1,018	257	304	584	a826	942	3,914
7	a526	1,805	1,172	a11,706	3,147	826	a234	295	752	716	1,665	3,560
8	680	1,385	1,140	10,412	2,694	752	188	309	a518	621	9,876	a2,878
9	665	1,630	1,420	7,343	2,326	a708	234	243	423	533	7,410	1,525
10	548	1,350	a1,324	5,400	1,770	562	295	276	314	570	a4,180	1,350
11	672	a1,525	1,350	4,242	1,299	548	200	a295	248	643	2,464	1,350
12	694	1,735	1,248	3,147	a1,197	562	182	446	333	811	1,875	1,095
13	665	1,420	1,385	4,056	1,350	504	215	418	342	a1,044	1,630	621
14	a651	1,420	....	a5,400	1,700	461	a280	342	314	1,140	2,418	847
15	797	1,197	....	7,476	1,299	428	599	285	a342	916	2,556	a811
16	737	993	5,574	11,048	1,420	a437	518	323	1,455	752	2,234	891
17	745	1,490	a5,340	12,028	2,464	489	257	370	1,630	628	a1,700	797
18	866	a1,274	2,878	9,950	3,206	482	271	a399	833	621	1,490	826
19	1,350	1,120	3,870	10,025	a2,832	394	243	215	1,420	891	1,095	3,622
20	1,595	1,875	4,614	7,476	1,770	351	257	248	1,299	a2,050	1,197	3,088
21	a1,665	2,510	2,740	a5,574	5,280	356	a390	271	1,172	1,770	1,095	2,464
22	2,096	2,234	1,805	6,220	6,280	276	442	351	a833	1,070	993	a1,805
23	1,350	1,700	1,770	12,594	4,366	a418	651	323	782	993	916	1,350
24	1,350	1,875	a1,490	8,928	2,602	399	409	333	1,420	2,326	a942	1,095
25	1,299	a1,875	1,274	5,516	2,050	347	319	a342	2,464	4,366	1,120	1,070
26	1,070	1,770	1,222	4,428	a1,945	333	243	257	2,970	4,490	1,140	866
27	1,095	1,875	1,018	5,100	1,490	356	262	328	1,840	a3,029	942	811
28	a1,350	1,735	1,248	a5,690	1,044	323	a285	356	1,248	1,980	847	767
29	1,140	1,560	4,860	4,800	1,018	285	208	295	a891	1,630	701	a730
30	1,140	....	4,920	3,870	2,602	a267	230	262	942	1,248	730	891
31	1,018	....	a5,040	....	2,648	....	333	437	....	1,140	....	1,945

a Sunday.

Monthly discharge of West Canada Creek at Kast Bridge, N. Y., for 1912.

[Drainage area, 575 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,096	475	1,003	1.74	2.01
February	2,510	993	1,561	2.71	2.92
March (29 days)	5,574	1,018	2,298	3.99	4.60
April	12,594	2,740	6,730	11.70	13.05
May	6,280	1,018	2,419	4.21	4.85
June	1,735	267	635	1.10	1.23
July	651	182	299	.520	.600
August	446	215	326	.567	.654
September	2,970	200	899	1.56	1.74
October	4,490	533	1,394	2.42	2.79
November	9,876	701	1,932	3.36	3.75
December	7,021	621	1,873	3.26	3.76

EAST CANADA CREEK AT DOLGEVILLE, N. Y.

Location.—At the dam of the Herkimer County Light & Power Co. at High Falls, near Dolgeville, about 7 miles above the mouth. Spruce Creek, the principal tributary, enters from the right about 1 mile above Dolgeville.

Records available.—1898 to 1912. Data also in the report of the Board of Engineers on Deep Waterways (1900) and the annual reports of the New York State engineer and surveyor.

Drainage area.—256 square miles.

Computations of discharge.—Discharge at this point consists of the flow over the spillway of the dam and the flow through the water wheels. The records have been computed from a discharge curve based on experiments with a full-sized model of this dam made at Cornell University. The flow through the turbines has been computed from current meter measurements made in the tailrace of the power plant.

Cooperation.—Records furnished for publication by the State engineer and surveyor.

Daily discharge, in second-feet, of East Canada Creek at Dolgeville, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	582	227	192	3,361	1,180	441	100	100	[a]88	305	486	
2	384	227	209	2,588	1,144	[a]338	113	85	112	423	317	
3	348	218	[a]159	2,385	903	491	125	92	183	349	[a]547	
4	191	[a]247	218	1,705	742	406	121	[a]110	252	379	461	
5	190	186	211	1,825	[a]1,044	382	95	85	172	385	404	
6	170	239	194	4,037	1,542	359	89	105	230	[a]283	420	
7	[a]519	255	190	[a]5,007	1,276	350	[a]81	95	212	244	453	
8	114	247	199	4,488	496	226	85	95	[a]144	243		
9	209	244	213	3,151	495	[a]257	105	95	117	243		
10	227	234	[a]223	2,528	486	245	95	100	121	243		
11	220	[a]271	200	1,842	424	226	85	[a]175	117	304		
12	252	210	195	1,460	[a]300	223	85	123	141	380		
13	193	200	394	1,236	395	214	95	105	130	[a]176		
14	[a]205	189	342	[a]2,470	398	210	[a]95	100	105	260		
15	230	168	468	3,713	389	180	124	105	[a]126	282		
16	226	196	909	4,860	406	[a]195	126	100	204	243		
17	222	163	[a]1,353	5,225	992	179	113	100	227	298		
18	200	[a]125	772	4,504	1,086	199	101	[a]93	191	243		
19	226	160	393	4,256	[a]976	183	95	100	479	447		
20	345	243	404	2,918	1,097	253	94	85	399	[a]828		
21	[a]401	243	557	[a]2,608	1,340	261	[a]100	134	346	765		
22	376	243	758	4,987	1,419	138	129	126	[a]261	546		
23	346	227	753	4,518	1,619	[a]138	107	105	249	595		
24	344	301	[a]550	3,470	1,235	127	102	256	329	689		
25	339	[a]237	632	2,038	971	128	127	[a]115	994	1,926		
26	284	204	862	1,950	[a]503	130	95	95	1,017	1,648		
27	359	241	1,078	2,395	550	142	105	115	668	[a]1,364		
28	[a]229	227	687	[a]2,149	505	155	[a]106	99	401	960		
29	227	209	745	1,659	919	137	75	105	[a]219	608		
30	227		1,039	1,663	432	[a]149	95	85	262	454		
31	227		[a]634		566		95	85		369		

[a] Sunday.

Monthly discharge of East Canada Creek at Dolgeville, N. Y., for 1912.

[Drainage area, 256 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	582	114	278	1.09	1.26
February	301	125	220	.859	.926
March	1,353	159	508	1.98	2.28
April	5,225	1,236	2,935	11.5	12.8
May	1,619	300	833	3.25	3.75
June	491	127	235	.918	1.02
July	129	75	102	.398	.459
August	256	85	109	.426	.491
September	1,017	88	273	1.07	1.19
October	926	176	532	2.08	2.40

SCHOHARIE CREEK AT PRATTSVILLE, N. Y.

Location.—At the single-span steel highway bridge at Prattsville.

Records available.—November 7, 1902, to December 31, 1912. Data also in reports of State engineer and surveyor, State of New York.

Drainage area.—240 square miles.

Gage.—Standard Board of Water Supply chain gage attached to the floor of the bridge on the upstream side near the left bank; established May 7, 1907, to replace the old gage, which was dilapidated and unwieldy. The old datum, 1,130.03 feet (United States Geological Survey bench mark), was preserved. Gage was read morning and evening by Miss Edna M. Snyder, of Prattsville, N. Y., until September 30, 1910, and by her brother, Charles Snyder, after that date.

Channel.—All the water passes between the abutments of the bridge except at the very highest stages.

Discharge measurements.—Made from the bridge at high stages; at low stages measurements may be made by wading at a point about 500 feet below the bridge.

Winter flow.—The winter record is obtained from a temporary gage established at a point about 500 feet below the bridge, where there is a sufficient velocity to prevent the channel from freezing over.

Artificial control.—Flow probably practically unaffected by fluctuations of stage from storage above Prattsville.

Cooperation.—Station assumed May 7, 1907, by the Board of Water Supply of the City of New York, by which data were furnished for publication.

Daily discharge, in second-feet, of Schoharie Creek at Prattsville, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	369	325	349	1,820	655	325	43	33	69	88	295	183
2	340	325	337	2,980	580	267	37	27	103	82	433	670
3	279	290	330	2,905	537	252	35	29	97	69	325	1,465
4	205	290	303	1,358	522	307	35	29	88	69	252	866
5	199	290	675	1,760	470	252	31	29	82	73	212	670
6	193	260	711	2,065	490	237	39	21	88	69	212	1,368
7	138	260	675	2,578	367	227	31	21	82	69	212	1,200
8	186	235	675	2,438	421	191	27	13	82	63	1,616	875
9	186	235	502	1,616	496	191	29	13	73	59	884	686
10	180	225	470	1,465	490	151	31	33	73	43	625	655
11	180	212	411	1,200	483	163	163	457	59	49	509	522
12	176	234	441	1,010	537	136	118	262	73	43	433	496
13	178	324	5,070	992	566	136	69	212	63	73	385	367
14	184	324	1,976	938	537	118	63	127	63	43	409	421
15	184	324	5,666	1,143	580	112	49	94	59	49	451	433
16	184	360	4,595	4,014	632	118	43	73	118	43	361	326
17	184	324	2,065	2,200	1,976	106	39	69	127	39	307	237
18	184	360	1,640	2,620	1,284	88	43	69	118	39	289	277
19	197	445	1,358	2,410	965	82	39	69	88	43	252	766
20	287	920	1,105	1,544	814	88	39	69	112	63	252	537
21	357	1,075	920	1,181	655	76	39	82	112	43	237	397
22	369	2,830	766	1,010	710	67	33	82	88	39	227	331
23	380	1,284	686	902	655	63	29	262	69	790	171	337
24	380	610	580	857	509	71	23	103	63	1,856	191	331
25	380	558	522	814	427	63	21	97	88	1,760	433	397
26	380	558	522	710	325	57	23	88	63	1,368	349	496
27	376	750	470	580	277	51	23	97	82	848	301	349
28	376	427	537	537	267	47	19	88	82	655	237	337
29	376	349	4,235	734	289	43	33	88	88	490	227	445
30	373	....	3,470	814	457	37	25	82	73	409	203	702
31	373	....	1,640	....	385	....	33	82	....	325	....	1,263

Monthly discharge of Schoharie Creek at Prattsville, N. Y., for 1912.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off.		Rainfall (inches).
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches.	Per cent of rainfall.	
January	380	176	270	1.12	1.296	78	1.66
February	2,830	212	517	2.15	2.321	108	2.14
March	5,666	303	1,410	5.88	6.768	167	4.06
April	4,014	537	1,573	6.55	7.305	150	4.88
May	1,976	267	592	2.47	2.843	78	3.64
June	325	37	137	.57	.639	42	1.52
July	163	19	42	.18	.205	8	2.60
August	457	13	94	.39	.452	12	3.84
September	127	59	84	.35	.394	11	3.48
October	1,856	39	315	1.31	1.512	45	3.31
November	1,616	171	376	1.57	1.749	56	3.14
December	1,465	183	594	2.48	2.851	100	2.86
The year	5,666	13	500	2.08	28.335	76	37.13

KINDERHOOK CREEK AT ROSSMAN, N. Y.

Location.—On highway bridge at Rossman, N. Y., 3¼ miles above the confluence of the creek, through Stockport Creek, with Hudson River, 1 mile above the mouth of Claverack Creek, which it joins to form Stockport Creek, and 9 miles by road above the village of Hudson.

Records available.—March 17, 1906, to December 31, 1912. Data published also in annual reports of State engineer and surveyor, State of New York.

Drainage area.—331 square miles.

Gage.—Tape and weight type attached to highway bridge; read twice daily; datum unchanged since established.

Channel.—Rock with some soil on sides.

Discharge measurements.—Made from single-span steel highway bridge.

Artificial control.—Low-water flow practically controlled by several power plants and paper mills above the station. Several small lakes also tend to affect low-water flow for short periods.

Winter flow.—Considerably affected by ice.

Accuracy.—Open-channel discharge rating curve very well defined. Accuracy of estimates depends entirely on accuracy of mean daily gage heights. "See Special study" below.

Special study.—A portable automatic gage was set up near the observer's gage and a continuous automatic record of gage heights was obtained from August 3 to August 12, and November 30 to December 5, 1912, inclusive. The true mean daily discharge was determined from hourly gage heights from the continuous record and was compared with the discharge obtained from semidaily observations. It appeared that daily discharges computed from semidaily observations were fairly good for discharges above 100 second-feet. The mean daily gage heights obtained from semidaily observations are being published, together with estimates for the periods when the daily discharge is above 100 second-feet. Further studies will be made with a view to determining whether gage readings for low-water periods can be made more valuable.

Daily measurements of Kinderhook Creek at Rossman, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 8[a]	Frank Weber	26.53	62
Sept. 9[b]	J. G. Mathers	26.77	120
Oct. 29	Frank Weber	27.90	749
Dec. 2	C. S. De Golyer	27.39	406

[a] Made by wading in tail race; about 3 second-feet leaking from flume.
[b] Made by wading below the gage.

Daily gage height, in feet, of Kinderhook Creek at Rossman, N. Y., for 1911–12.

[Lester Allen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	28.6	27.38	26.86	28.2	27.37	26.66	26.66	26.51	27.30	27.0	27.7	27.7
2	28.8	27.55	27.06	27.85	27.47	26.71	26.45	26.34	27.13	27.42	27.65	27.65
3	28.8	27.46	26.96	27.7	27.6	26.66	26.50	26.35	26.82	27.35	27.65	27.55
4	28.25	27.55	27.08	27.7	27.55	26.66	26.50	26.48	26.87	27.46	27.6	27.5
5	28.05	27.42	27.8	27.75	27.45	26.65	26.56	26.30	26.76	27.75	27.5	27.5
6	28.15	27.55	27.65	29.0	27.29	26.69	26.69	26.28	26.83	27.65	27.42	27.38
7	28.25	27.6	27.48	29.5	27.29	27.12	26.64	26.52	26.98	27.5	27.42	27.22
8	28.25	27.55	27.43	28.9	27.18	26.95	26.55	26.61	27.19	27.5	27.5	27.31
9	27.8	27.3	27.35	28.6	27.17	26.95	26.44	26.48	27.48	27.5	27.44	27.38
10	27.75	27.13	27.29	28.6	27.02	26.85	26.55	26.18	28.1	27.43	27.43	27.32
11	27.6	27.0	27.22	28.8	27.04	26.69	26.56	26.09	27.7	27.34	27.42	27.41
12	27.55	26.83	27.1	28.6	26.91	26.69	26.58	26.04	27.48	27.14	27.25	27.4
13	27.7	26.7	27.48	28.25	26.95	28.15	26.66	26.22	27.26	26.98	27.8	27.41
14	27.7	26.56	27.8	28.3	27.12	28.5	26.57	26.44	27.11	26.9	27.65	27.36
15	27.55	26.59	29.6	28.35	27.01	28.15	26.12	26.48	27.2	26.95	27.6	27.41
16	27.35	26.5	28.7	28.7	26.86	27.85	26.16	26.51	27.14	26.95	27.65	27.55
17	27.36	26.66	27.48	28.5	26.94	27.46	26.38	26.63	27.11	27.0	27.5	27.95
18	27.33	26.8	27.13	28.2	26.87	27.25	26.55	26.41	27.13	27.22	27.6	27.8
19	27.37	27.75	27.36	28.15	26.97	27.18	26.58	26.38	26.98	29.1	28.15	27.6
20	27.55	27.85	27.48	28.0	26.97	27.2	26.70	26.20	26.96	28.5	27.85	27.5
21	27.28	27.43	27.55	27.85	26.97	27.02	26.53	26.27	26.92	28.35	27.75	27.39
22	27.46	26.63	27.7	27.8	26.86	26.88	26.55	26.44	26.85	28.7	27.65	27.55
23	27.13	26.34	28.15	27.7	27.8	26.74	26.34	26.32	27.08	29.4	27.6	28.3
24	27.02	26.36	27.85	27.75	26.81	26.72	26.55	26.50	27.05	29.6	27.6	28.45
25	26.8	26.63	27.35	27.65	26.82	26.66	26.42	26.62	26.82	29.0	27.9	28.4
26	26.82	27.26	27.38	27.44	26.78	26.66	26.56	26.44	26.70	28.6	27.65	27.85
27	26.78	27.26	28.5	27.44	26.76	26.74	26.52	26.30	26.9	28.25	27.65	28.1
28	29.1	27.1	30.2	27.46	26.68	26.68	26.61	26.51	26.85	28.1	27.7	28.2
29	27.95	....	28.8	27.38	26.69	26.73	26.28	27.48	26.96	27.85	28.1	27.8
30	27.85	....	30.1	27.40	26.62	26.75	26.26	27.75	26.94	27.8	27.85	27.6
31	27.55	....	29.0	....	26.59	....	26.51	27.45	....	27.65	....	27.6
1912.												
1	27.5	....	....	29.1	28.05	28.25	26.69	26.24	26.26	26.48	27.47	27.37
2	27.55	....	....	29.2	27.75	28.0	26.62	26.35	26.33	26.50	27.44	27.7
3	27.6	....	....	30.2	27.6	28.2	26.60	26.34	26.74	26.58	27.31	28.1
4	27.65	....	....	29.2	27.6	28.2	26.40	26.30	26.72	26.53	27.24	28.05
5	27.36	....	....	29.0	27.6	27.85	26.37	26.20	26.76	26.52	27.21	27.85
6	27.25	....	....	29.1	27.6	27.7	26.23	26.27	26.64	26.39	27.22	27.9
7	27.11	....	....	29.3	27.85	27.95	26.22	26.32	26.69	26.42	27.31	27.95
8	27.4	....	....	30.8	27.6	27.75	26.14	26.22	26.68	26.55	28.2	27.8
9	27.41	....	....	29.6	27.65	27.5	26.15	26.22	26.76	26.52	28.2	27.6
10	27.42	....	....	29.4	28.0	27.43	26.46	26.15	26.52	26.49	27.9	27.55
11	27.5	....	....	29.2	27.9	27.36	26.58	26.29	26.60	26.48	27.75	27.55
12	27.50	....	....	28.8	27.7	27.18	26.60	26.16	26.5	26.55	27.65	27.41
13	27.75	....	....	28.6	27.7	27.13	26.53	26.15	26.58	26.32	27.48	27.36
14	27.8	....	....	28.4	27.7	27.15	26.59	26.16	26.40	26.35	27.41	27.28
15	27.75	....	....	28.3	27.65	27.28	26.63	26.19	26.38	26.54	27.8	27.22
16	27.9	....	28.7	28.9	27.7	27.15	26.41	26.16	26.68	26.59	27.6	27.36
17	27.95	....	30.8	29.6	28.45	26.92	26.34	26.14	26.85	26.58	27.48	27.32
18	28.1	....	29.2	29.4	28.25	26.95	26.42	26.22	26.75	26.56	27.38	27.33
19	28.0	....	29.4	29.1	28.1	26.88	26.45	26.14	26.74	26.52	27.29	27.65
20	28.4	....	29.1	28.9	27.9	26.91	26.46	26.16	26.72	26.42	27.29	28.1
21	....	....	28.8	28.5	27.85	26.85	26.32	26.28	26.65	26.31	27.34	27.8
22	....	....	28.35	28.4	27.95	26.84	26.51	26.14	26.66	26.52	27.34	27.55
23	....	....	28.15	28.4	27.85	26.76	26.53	26.18	26.61	26.70	27.31	27.5
24	....	....	27.38	28.6	27.65	26.77	26.56	26.42	26.61	29.80	27.21	27.48
25	....	....	27.8	28.5	27.55	26.74	26.48	26.35	26.68	29.6	28.0	27.5
26	....	....	27.9	28.3	27.50	26.72	26.18	26.42	26.67	28.50	28.0	27.8
27	....	....	28.2	28.2	27.45	26.76	26.25	26.36	26.62	28.30	27.8	27.9
28	....	....	28.3	27.9	27.43	26.68	26.27	26.38	26.66	27.9	27.6	27.8
29	....	....	29.3	27.9	27.55	26.58	26.19	26.18	26.50	27.7	27.5	27.65
30	....	....	29.7	28.1	28.8	26.40	26.16	26.28	26.28	27.55	27.5	27.7
31	....	....	28.9	....	28.35	....	26.42	26.28	....	27.5	....	28.6

NOTE.—Relation of gage height to discharge during 1911 little if at all affected by ice. In 1912 the relation of gage height to discharge was affected by ice Jan. 21 to Mar. 15.

Daily discharge, in second-feet, of Kinderhook Creek at Rossman, N. Y., for 1911–12.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	1,340	401	173	988	380	111	111	......	359	225	602	602
2	1,540	502	249	710	453	125	......	......	278	424	568	568
3	1,540	467	209	602	534	111	......	......	160	386	568	502
4	1,030	502	257	602	502	111	......	......	160	447	534	470
5	866	424	673	638	441	108	......	......	141	638	470	470
6	948	502	568	1,750	354	119	119	......	163	568	424	401
7	1,030	534	458	2,340	354	274	105	......	218	470	424	320
8	1,030	502	429	1,640	301	206	......	......	305	470	470	364
9	673	359	386	1,340	296	206	......	......	458	470	435	401
10	638	278	354	1,340	233	170	......	......	906	429	429	370
11	534	255	320	1,540	241	119	......	......	602	379	424	418
12	502	163	265	1,340	191	119	......	......	458	283	334	412
13	602	122	458	1,070	206	947	111	......	334	218	673	418
14	602	82	673	1,070	274	1,250	......	......	270	187	568	390
15	502	90	2,460	1,120	229	947	......	......	310	206	534	418
16	386	77	1,440	1,440	173	710	......	......	283	206	568	502
17	391	111	458	1,250	202	447	......	102	270	225	470	787
18	375	153	278	988	177	334	......	......	278	320	534	673
19	396	638	391	947	214	301	......	......	218	1,860	947	534
20	502	710	458	826	214	310	122	......	210	1,250	710	470
21	349	429	502	710	214	233	......	......	195	1,110	638	407
22	447	102	602	673	173	180	......	......	170	1,440	568	502
23	278	60	947	602	673	134	......	......	257	2,210	534	1,070
24	233	64	710	638	156	128	......	......	245	2,460	534	1,210
25	153	102	386	568	160	111	......	......	160	1,750	748	1,160
26	160	339	401	435	146	111	......	......	122	1,440	568	710
27	147	339	1,250	435	141	134	......	......	187	1,030	568	906
28	1,860	265	3,280	447	116	116	......	......	170	906	602	988
29	787	......	1,540	401	119	131	......	458	210	710	906	673
30	710	......	3,140	412	100	138	......	638	202	673	710	534
31	502	......	1,750	......	92	......	......	441	......	568	......	534
1912.												
1	470	......	......	1,860	866	1,030	119	......	......	......	453	396
2	502	......	......	1,980	638	826	100	......	......	......	435	602
3	534	......	......	3,280	534	988	......	......	134	......	364	906
4	568	......	......	1,980	534	988	......	......	128	......	330	866
5	391	......	......	1,750	534	710	......	......	141	......	315	710
6	334	......	......	1,860	534	602	......	......	105	......	320	748
7	270	......	......	2,090	710	787	......	......	119	......	364	787
8	412	......	......	4,200	534	638	......	......	116	......	988	673
9	418	......	......	2,460	568	470	......	......	141	......	988	534
10	424	......	......	2,210	826	429	......	......	......	......	748	502
11	470	......	......	1,980	748	391	......	......	......	......	638	502
12	470	......	......	1,540	602	301	......	......	......	......	568	418
13	638	......	......	1,340	602	278	......	......	......	......	458	391
14	673	......	......	1,160	602	288	......	......	......	......	418	349
15	638	......	......	1,070	568	349	102	......	......	......	673	320
16	748	......	1,440	1,640	602	288	......	......	116	......	534	391
17	787	......	4,200	2,460	1,210	195	......	......	170	......	458	370
18	906	......	1,980	2,210	1,030	206	......	......	138	......	401	375
19	826	......	2,210	1,860	906	180	......	......	134	......	354	568
20	1,160	......	1,860	1,640	748	191	......	......	128	......	354	906
21	......	......	1,540	1,250	710	170	......	......	108	......	380	673
22	......	......	1,120	1,160	787	167	......	......	111	......	380	502
23	......	......	947	1,160	710	141	......	......	......	122	364	470
24	......	......	401	1,340	568	144	......	......	......	2,720	315	458
25	......	......	673	1,250	502	134	......	......	116	2,460	826	470
26	......	......	748	1,070	470	128	......	......	114	1,250	826	673
27	......	......	988	988	441	141	......	......	100	1,070	673	748
28	......	......	1,070	748	429	116	......	......	111	748	534	673
29	......	......	2,090	748	502	90	......	......	......	602	470	568
30	......	......	2,590	906	1,540	70	......	......	......	502	470	602
31	......	......	1,640	......	1,120	......	......	......	......	470	......	1,340

NOTE.—Daily discharge determined from a rating curve that is not well defined for high stages. When flow is below 100 second-feet, discharge given does not represent mean for the day, because of diurnal fluctuation.

Monthly discharge of Kinderhook Creek at Rossman, N. Y., for 1911–12.

[Drainage area, 331 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
January	1,860	147	679	2.05	2.36	B.
February	710	60	306	.924	.96	B.
March	3,280	173	821	2.48	2.86	B.
April	2,340	401	962	2.91	3.25	B.
May	673	92	260	.785	.91	B.
June	1,250	108	281	.849	.95	B.
September	906	122	277	.837	.93	B.
October	2,460	187	773	2.34	2.70	B.
November	947	334	569	1.72	1.92	B.
December	1,210	320	587	1.77	2.04	B.
1912.						
March 16–31	4,200	401	1,590	4.80	2.86	B.
April	4,200	748	1,710	5.17	5.77	B.
May	1,540	429	699	2.11	2.43	B.
June	1,030	70	381	1.15	1.28	B.
October 23–31	2,720	122	1,100	3.32	1.11	B.
November	988	315	513	1.55	1.73	B.
December	1,340	320	596	1.80	2.08	B.

ESOPUS CREEK NEAR OLIVEBRIDGE, N. Y.

Location.—About 1 mile below Olivebridge post office, at a weir constructed for the purpose of determining the flow of the creek.

Records available.—October 17, 1906, to December 31, 1912. Data also in annual reports of the New York State engineer and surveyor

Drainage area.—239 square miles.

Gage.—Automatic water-stage register geared 1 to 1 and running 24 hours, in a well 24 inches in diameter, situated 53 feet upstream from the crest of the weir. Water is admitted to this well through a three-fourths-inch pipe extending 16 feet out into the stream in which, spaced 6 inches apart, are one-eighth-inch holes bored vertically through the pipe. The center of this pipe is 18 inches above the bed of the stream. The automatic gage was installed December 5, 1906. From October 17, 1906, to December 5, 1906, head of water on the weir was read three times daily and reduced in the usual manner.

Discharge measurement.—Computations of discharge over the weir are made from a formula deduced from the results of experiments made by the United States Geological Survey in the hydraulic laboratory at Cornell University in series 30, described in Water-Supply Papers 150 and 200. The weir is of concrete, 193.90 feet between abutments and 7.54 feet (average height for entire length) above the rock in which it is founded. To form a channel of approach the abutments have been extended upstream at right angles with the axis of the weir for a distance of 16 feet; area of channel of approach below crest of weir, 1,462 square feet. Abutments extend 14 feet above the level of the crest; it is estimated that a flow of 40,000 cubic feet per second can be taken care of.

Winter flow.—The ice which forms between the wing walls which define the channel of approach is kept cut away during the winter so that there may be no change in conditions of flow caused by ice.

Artificial control.—The effect of such slight fluctuations in daily stage as may result from power control above Olivebridge is practically eliminated from the records by the use of the automatic gage.

Cooperation.—Weir constructed and operated and data furnished for publication by the Board of Water Supply of the city of New York.

Daily discharge, in second-feet, of Esopus Creek (weir station) near Olivebridge, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	620	215	667	2,415	1,033	370	67	57	150	122	493	286
2	467	175	509	3,470	876	366	67	53	256	122	600	493
3	448	144	389	5,100	760	362	62	62	228	122	483	1,509
4	410	150	380	2,750	668	299	62	57	215	116	428	1,129
5	333	182	307	1,850	597	290	72	48	182	110	392	945
6	264	162	231	1,980	684	296	133	44	194	100	366	1,495
7	196	133	255	2,800	611	301	105	44	194	94	650	1,373
8	307	110	336	2,950	598	255	78	40	175	94	1,780	1,105
9	243	110	544	1,796	626	234	72	44	156	89	1,217	910
10	292	110	424	1,410	590	214	122	144	144	94	978	785
11	243	84	372	1,110	584	189	110	1,551	133	89	830	693
12	278	116	380	908	584	182	105	483	144	89	725	600
13	337	84	3,826	761	692	174	94	308	150	78	640	475
14	307	105	1,443	670	682	157	105	242	144	72	693	467
15	266	133	4,150	800	655	162	105	215	139	72	600	428
16	266	116	5,510	3,205	1,700	175	89	175	156	67	525	410
17	196	110	3,870	2,142	2,700	175	78	144	156	67	475	375
18	196	110	2,318	2,455	1,850	162	78	188	144	67	448	358
19	208	117	2,220	2,378	1,565	150	72	215	144	67	410	753
20	667	208	2,238	1,780	1,082	144	62	235	139	62	382	640
21	606	255	1,850	1,365	910	122	72	242	127	62	358	550
22	456	1,439	1,410	1,090	830	122	84	301	116	62	333	512
23	395	1,381	1,135	1,035	728	110	62	400	116	1,165	312	483
24	410	1,088	934	855	603	105	57	366	127	1,810	467	456
25	365	1,062	748	907	550	105	53	308	169	1,593	763	428
26	255	1,275	571	802	475	100	53	271	150	1,191	502	400
27	208	1,734	500	774	452	94	53	242	127	898	420	532
28	220	1,439	723	658	405	84	48	208	122	732	375	542
29	208	983	2,900	800	384	78	53	182	122	620	333	448
30	220	......	3,020	1,108	491	72	62	162	122	525	308	956
31	243	......	2,165	......	415	......	57	150	......	456	......	1,321

Monthly discharge of Esopus Creek (weir station) near Olivebridge, N. Y., for 1912.

[Drainage area, 239 square miles.]

Month.	Discharge in second-feet.				Run-off.		Rainfall (inches).
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches.	Per cent of rainfall.	
January	667	196	327	1.37	1.577	66	2.38
February	1,734	84	460	1.92	2.071	70	2.96
March	5,510	231	1,494	6.25	7.208	121	5.96
April	5,100	658	1,737	7.27	8.107	141	5.76
May	2,700	384	819	3.43	3.948	91	4.36
June	370	72	188	.79	.876	51	1.72
July	133	48	77	.32	.370	11	3.25
August	1,551	40	232	.97	1.116	15	7.47
September	256	116	155	.65	.718	21	3.44
October	1,810	62	352	1.47	1.698	35	4.84
November	1,780	308	576	2.41	2.691	66	4.08
December	1,509	286	705	2.95	3.415	73	4.70
The year	5,510	40	594	2.49	33.795	66	50.92

ESOPUS CREEK AT MOUNT MARION, N. Y.

Location.—At the single-span steel highway bridge at Pleasant Valley, on the Saugerties road, 1 mile east of Mount Marion station on the West Shore Railroad.

Records available.—April 4, 1907, to December 31, 1912. Data also in annual reports of State engineer and surveyor, State of New York.

Drainage area.—378 square miles.

Gage.—Standard Board of Water Supply chain gage fastened to the downstream side of the bridge, read twice daily. In May, 1908, the floor of the bridge was renewed, but provision was made for accurate gage readings during that period.

Channel.—Straight for about 1,000 feet above the station and 600 feet below, one at all stages. Bed, ledge rock with strata steeply inclined, giving jagged corners and irregular but permanent cross section. Banks rocky and steep; right bank about 40 feet above water level; left bank at least 100 feet high.

Discharge measurements.—At high stages made from the bridge; at low stages at a wading section three-fourths of a mile above the bridge and about three-fourths of a mile below Glenerie Falls; 200 feet from the Kingston-Saugerties road which parallels the creek on the right bank. At the wading section, which is used only when the water is less than 3 feet deep, the bed is gravelly and liable to some change, but the current is swift and good measurements are obtained. The banks at the wading section are of the same character as those at the bridge.

Winter flow.—Affected by ice. Measurements through the ice; gage readings to ice and water.

Accuracy.—Such slight fluctuation in daily stage as may result from the operation of the power plants above Mount Marion probably causes no material error in the estimates of daily discharge.

Cooperation.—Established and maintained and records furnished for publication by Board of Water Supply, city of New York. Gage read morning and afternoon by John Sauer, of Saugerties.

Daily discharge, in second-feet, of Esopus Creek at Mount Marion, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	810	338	1,026	3,385	1,406	585	101	68	164	138	635	485
2	685	302	783	3,730	1,140	485	108	74	260	130	1,000	475
3	635	286	598	7,230	1,070	780	101	68	375	130	810	2,180
4	585	273	585	4,080	979	575	101	68	347	130	675	1,653
5	525	222	472	2,844	912	525	101	63	265	111	585	1,350
6	455	222	356	2,640	1,021	515	115	58	247	101	525	2,013
7	302	234	392	3,000	1,021	625	146	58	234	94	525	2,200
8	472	234	518	3,870	930	485	122	58	222	94	3,385	1,770
9	374	222	837	2,360	1,049	395	111	58	210	87	2,160	1,430
10	450	189	652	1,950	930	325	97	70	182	87	1,743	1,245
11	374	172	572	1,653	810	288	125	1,680	173	101	1,350	1,035
12	428	180	585	1,406	765	273	119	675	164	115	1,091	828
13	518	164	6,924	1,350	1,091	260	108	355	164	115	979	635
14	472	172	3,346	1,245	1,105	222	115	247	155	108	1,070	685
15	410	180	3,385	1,189	1,021	229	108	222	155	108	930	700
16	410	189	11,400	2,760	1,119	222	101	206	155	101	810	625
17	302	189	4,375	2,820	4,180	260	94	169	155	101	700	575
18	302	200	3,385	3,125	2,796	229	87	191	159	101	635	525
19	320	180	3,190	3,450	2,040	210	87	222	173	108	585	1,070
20	1,026	320	3,000	2,676	1,653	200	80	222	164	105	535	1,189
21	932	392	2,460	2,130	1,406	187	83	239	155	91	485	930
22	702	2,214	2,130	1,770	1,210	177	91	282	146	87	443	828
23	608	2,124	1,635	1,725	1,070	155	101	443	146	818	415	750
24	630	1,674	1,617	1,470	948	138	83	475	173	3,730	443	685
25	562	1,634	1,390	1,390	828	146	68	375	182	2,676	1,470	625
26	392	1,962	1,231	1,210	715	146	68	294	182	2,040	930	575
27	320	2,668	1,161	1,119	625	138	63	255	173	1,470	792	840
28	338	2,214	1,454	1,021	535	138	58	229	159	1,189	665	1,070
29	320	1,512	4,780	1,000	550	130	58	210	146	948	585	840
30	338	....	5,412	1,887	948	115	53	195	146	780	535	900
31	374	....	3,520	....	750	....	63	178	....	685	....	979

Monthly discharge of Esopus Creek at Mount Marion, N. Y., for 1912.

[Drainage area, 378 square miles.]

Month.	Discharge in second-feet.				Run-off.		Rainfall inches.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches.	Per cent of rainfall.	
January	1,026	302	496	1.31	1.510	66	2.29
February	2,668	164	719	1.90	2.057	73	2.81
March	11,400	356	2,360	6.24	7.198	122	5.90
April	7,230	1,000	2,383	6.31	7.033	129	5.47
May	4,180	535	1,181	3.12	3.598	84	4.26
June	780	115	305	.81	.904	51	1.78
July	146	53	94	.25	.289	9	3.09
August	1,680	58	258	.68	.790	11	6.90
September	375	146	191	.51	.562	17	3.34
October	3,730	87	522	1.38	1.594	34	4.66
November	3,385	415	916	2.42	2.708	69	3.93
December	2,200	475	1,022	2.70	3.114	68	4.56
The year	11,400	53	871	2.30	31.357	64	48.99

RONDOUT CREEK AT ROSENDALE, N. Y.

Location.—At single-span steel highway bridge at Rosendale.

Records available.—July 6, 1901, to December 31, 1912, except from November 7, 1903, to December, 1905. Data also in annual reports of the State engineer and surveyor, State of New York.

Drainage area.—380 square miles.

Gage.—Standard Board of Water Supply chain gage fastened to the middle panel of the downstream side of the bridge. This gage was established June 1, 1907, to replace the original gage.

Channel.—One at all stages.

Discharge measurements.—At high and medium stages made from the bridge; at low stages by wading at a point about 1,000 feet below the bridge.

Winter flow.—The winter flow is obtained by actual measurements at selected stations on the creek through the ice and by wading, and by comparison with gage readings to water and ice at the bridge.

Diversions.—A portion of the water of the creek is diverted by a dam below High Falls and sent through the Delaware & Hudson Canal, and is returned to the creek below the gaging station. At Rock Locks, about 1½ miles below Rosendale, there is an overflow weir from which the discharge of the canal may be approximately determined. The weir, the crest of which is 3.8 feet in length, is at the left end of the lock and is equipped with a standard Board of Water Supply staff gage.

Artificial control.—Slight daily fluctuations in stage are caused by storage at Honk Falls, Napanoch, and to some extent at High Falls. Proper allowance is made in the daily discharge records for the water diverted to the Delaware & Hudson Canal.

Cooperation.—Data furnished for publication by the Board of Water Supply of the City of New York, by which the station was assumed on June 1, 1907.

Daily discharge, in second-feet, of Rondout Creek at Rosendale, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	906	972	725	2,740	1,690	441	91	84	111	78	568	426
2	874	1,035	600	4,932	1,270	368	65	73	139	99	700	352
3	930	1,080	625	6,308	1,010	873	131	57	278	69	550	442
4	986	990	650	2,992	890	585	107	66	302	80	362	370
5	1,070	923	625	2,096	794	481	94	58	244	118	306	690
6	1,017	837	417	1,808	842	386	100	65	214	89	253	2,180
7	972	909	505	1,736	1,018	569	83	65	179	90	734	1,390
8	945	873	525	2,240	1,100	522	73	65	99	71	3,185	850
9	972	938	760	1,570	1,250	381	47	55	94	118	2,029	770
10	990	873	550	1,430	1,130	333	67	117	133	101	1,630	826
11	972	1,170	365	1,190	898	293	76	2,326	111	107	695	842
12	972	679	445	1,060	794	316	72	620	103	101	587	922
13	945	635	9,200	1,050	906	305	68	319	157	135	714	778
14	909	729	3,286	1,002	922	274	69	237	133	125	558	714
15	945	779	4,292	1,034	770	326	100	231	101	119	444	530
16	972	657	7,580	1,300	1,500	246	98	127	86	127	360	205
17	945	1,125	3,908	1,360	4,228	239	90	97	107	106	452	442
18	972	801	3,104	2,372	2,108	293	92	122	111	94	434	1,050
19	1,035	729	3,160	2,706	1,450	244	87	329	112	106	484	1,470
20	1,350	1,044	2,456	1,940	1,110	209	76	277	82	90	440	1,170
21	1,305	972	1,904	1,550	970	200	68	204	79	92	368	810
22	1,242	1,510	1,640	1,330	842	235	93	258	107	103	322	698
23	1,224	2,250	1,210	1,110	714	140	131	189	73	282	233	682
24	1,152	1,419	1,400	1,018	682	129	96	219	134	2,907	396	794
25	1,080	1,531	1,530	938	602	129	98	216	100	1,950	309	666
26	1,035	1,970	1,220	858	521	144	103	143	127	1,584	366	618
27	990	1,674	1,230	810	473	127	75	126	155	892	388	754
28	945	1,770	1,856	858	521	116	50	111	163	650	372	826
29	945	1,475	6,052	1,070	777	97	73	116	121	728	432	690
30	972	....	5,444	3,104	784	108	50	71	115	529	402	954
31	990	....	3,780	....	545	....	59	84	....	516	....	2,894

Monthly discharge of Rondout Creek at Rosendale, N. Y., for 1912.

[Drainage area 380 square miles.]

Month.	Discharge in second-feet.				Run-off.		Rainfall, inches.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches.	Per cent of rainfall.	
January	1,350	874	1,018	2.68	3.087	153	2.02
February	2,250	635	2,250	2.93	3.163	139	2.27
March	9,200	365	2,292	6.03	6.953	119	5.82
April	6,308	810	1,853	4.87	5.444	104	5.24
May	4,228	473	1,068	2.81	3.247	85	3.80
June	873	97	304	.80	.892	50	1.79
July	131	47	83	.22	.254	10	2.65
August	2,326	55	230	.60	.693	11	6.20
September	302	73	136	.36	.398	11	3.59
October	2,907	69	395	1.04	1.202	31	3.86
November	3,185	233	636	1.67	1.867	61	3.06
December	2,894	205	865	2.28	2.623	57	4.58
The year	9,200	47	833	2.19	29.823	66	44.87

DELAWARE RIVER BASIN.

EAST BRANCH OF DELAWARE RIVER AT FISH EDDY, N. Y.

Location.—At the highway bridge near the New York, Ontario & Western Railway station at Fish Eddy, 5½ miles above the confluence of the East and West branches of the Delaware at Hancock.

Records available.—November 19 to December 31, 1912.

Drainage area.—790 square miles (Post Route map).

Gage.—Vertical staff, in two sections.

Channel.—Coarse gravel; apparently permanent.

Discharge measurements.—At low stages made by wading; at high stages from the highway bridge.

Winter flow.—Probably somewhat affected by ice.

Accuracy.—Discharge rating curve fairly well defined.

The following discharge measurement was made by Frank Weber:

November 20, 1912: Gage height 3.59 feet, discharge 1,050 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of East Branch of Delaware River at Fish Eddy, N. Y., for 1912.

[John J. Fininegan, observer.]

Day.	October.		November.		Day.	October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
1			3.3	800	16			3.9	1,320
2			3.4	870	17			3.8	1,220
3			8.0	7,450	18			3.3	800
4			6.5	4,470	19	3.6	1,040	5.2	2,890
5			5.7	3,660	20	3.6	1,040	5.3	3,040
6			6.7	4,830	21	3.5	950	4.9	2,470
7			6.6	4,630	22	3.4	870	4.5	1,960
8			5.8	3,820	23	3.3	800	4.3	1,740
9			5.3	3,040	24	3.35	835	4.3	1,740
10			5.0	2,600	25	4.1	1,520	4.2	1,630
11			4.8	2,330	26	3.8	1,220	4.0	1,420
12			3.8	1,220	27	3.7	1,130	3.8	1,220
13			3.7	1,130	28	3.6	1,040	3.8	1,220
14			3.5	950	29	3.45	910	3.9	1,320
15			4.0	1,420	30	3.4	870	3.7	1,130
					31			6.1	3,810

NOTE.—Daily discharge determined from a fairly well-defined rating curve based on measurements made during 1912 and 1913.

Monthly discharge of East Branch of Delaware River at Fish Eddy, N. Y., for 1912.

[Drainage area, 790 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
November 19-30	1,520	800	1,020	1.29	0.576	B.
December	7,450	800	2,330	2.95	3.40	B.

EAST BRANCH OF DELAWARE RIVER AT HANCOCK, N. Y.

Location.—At the highway bridge half a mile southeast of the Erie Railroad station at Hancock, N. Y., about 1 mile above the junction of East and West branches of Delaware River and 10 miles below the mouth of Beaver Kill, the nearest tributary, which enters from the left.

Records available.—October 14, 1902, to December 31, 1912. Data also in annual reports of New York State engineer and surveyor.

Drainage area.—840 square miles.[1]

Gage.—Standard chain, fastened to upstream left-hand end of bridge; read once daily; datum unchanged.

Channel.—Both banks of medium height; not liable to overflow; bed composed of rocks and gravel.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—Affected by needle and cake ice which forms on the control point and produces backwater at the gage.

Accuracy.—Conditions fairly good for accurate determinations of discharge. High-water stage probably affected at times by backwater caused by gorging at junction with the West Branch. Low-water discharge controlled by riffles just below Erie Railroad bridge which sometimes shift and require many measurements and possibly a new discharge rating curve each year. Conditions, however, have been fairly permanent during the last two or three years.

Cooperation.—Maintained since January 1, 1908, in cooperation with the United States Weather Bureau.

Discharge measurements of East Branch of Delaware River at Hancock, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 22[a]	C. S. De Golyer	5.14	1,270
July 27[b]	Frank Weber	2.78	228
Nov. 20	.....do	3.69	1,060
22	.....do	3.58	910

[a] Measurements made under complete ice cover.
[b] Measurements made by wading at regular section.

Daily gage height, in feet, of East Branch of Delaware River at Hancock, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.2	4.5	5.0	6.9	5.1	3.6	2.7	2.8	3.2	3.2	3.8	3.5
2	3.9	4.5	4.8	6.9	4.8	3.5	2.7	2.7	3.5	3.3	4.2	3.5
3	4.0	4.4	4.7	10.0	4.6	3.5	2.6	2.7	3.8	3.2	4.0	6.7
4	4.5	4.4	4.6	7.1	4.4	3.6	2.6	2.7	3.8	3.2	3.8	5.6
5	4.2	4.3	4.6	6.0	4.3	3.5	2.6	2.7	3.6	3.1	3.7	5.2
6	3.7	4.3	4.5	5.9	4.2	3.4	2.6	2.7	3.5	3.1	3.7	5.0
7	3.8	4.3	4.4	6.3	4.3	3.6	2.6	2.6	3.5	3.1	3.7	5.6
8	3.9	4.3	4.4	7.6	4.2	3.6	2.6	2.5	3.4	3.0	5.9	5.2
9	4.9	4.2	4.6	6.3	4.4	3.4	2.6	2.5	3.3	3.0	5.3	4.9
10	4.8	4.2	4.8	5.7	4.4	3.3	3.0	2.7	3.3	3.0	4.9	4.6
11	4.8	4.1	4.6	5.4	4.2	3.3	2.9	4.4	3.2	3.1	4.6	4.4
12	4.8	4.1	4.4	5.1	4.0	3.2	2.9	3.8	3.2	3.1	4.5	4.3
13	4.6	4.1	4.8	5.2	4.2	3.2	2.8	3.4	3.2	3.1	4.3	4.0
14	4.6	4.1	5.6	5.0	4.1	3.2	2.9	3.3	3.1	3.0	4.2	4.0
15	4.6	4.1	5.1	4.9	4.0	3.1	3.0	3.1	3.0	3.0	4.2	4.0

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[1] Revised measurement.

Daily gage height, in feet, of East Branch of Delaware River at Hancock, N. Y., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	4.6	4.1	10.9	7.4	4.0	3.1	2.9	3.1	3.2	3.0	4.0	3.9
17	4.5	4.1	6.9	7.3	5.0	3.1	2.8	3.0	3.2	2.9	3.9	3.8
18	4.5	4.2	6.6	6.8	4.9	3.1	3.4	3.1	3.1	2.9	3.8	3.7
19	4.7	4.2	6.7	7.5	4.6	3.0	3.5	3.3	3.1	2.9	3.7	4.0
20	4.9	4.2	6.7	6.7	4.5	3.0	3.2	3.4	3.2	3.0	3.7	5.0
21	5.0	4.3	6.6	5.9	4.4	2.9	3.0	3.3	3.1	3.0	3.6	4.5
22	4.9	4.9	5.5	5.4	4.2	2.9	3.1	3.8	3.0	3.0	3.6	4.3
23	4.9	5.6	4.9	5.3	4.2	2.9	3.0	3.9	3.0	3.0	3.5	4.2
24	4.8	5.3	4.9	5.1	4.0	2.9	2.9	4.3	3.1	6.1	3.5	4.2
25	4.7	5.2	4.7	5.2	4.0	2.9	2.8	3.9	3.4	5.9	3.9	4.2
26	4.7	5.3	4.3	4.8	3.8	2.8	2.8	4.0	3.5	5.1	3.9	4.0
27	4.7	5.4	4.3	4.7	3.7	2.8	2.8	3.8	3.4	4.7	3.7	4.0
28	4.7	5.8	5.5	4.7	3.6	2.8	2.7	3.6	3.3	4.4	3.7	3.9
29	4.6	5.4	7.8	4.5	3.5	2.7	2.7	3.5	3.2	4.3	3.6	4.0
30	4.6	......	7.8	5.6	3.9	2.7	2.8	3.5	3.2	4.1	3.6	4.0
31	4.6	......	6.3	......	3.8	......	2.8	3.3	......	3.9	......	5.4

NOTE.—Relation of discharge to gage height affected by ice Jan. 9 to Mar. 15.

Daily discharge, in second-feet, of East Branch of Delaware River at Hancock, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,880	......	......	8,810	3,750	940	190	240	520	520	1,220	820
2	1,380	......	......	8,810	3,070	820	190	190	820	610	1,880	820
3	1,540	......	......	19,800	2,640	820	144	190	1,220	520	1,540	8,170
4	2,440	......	......	9,470	2,250	940	144	190	1,220	520	1,220	4,990
5	1,880	......	......	6,070	2,060	820	144	190	940	440	1,070	3,990
6	1,070	......	......	5,790	1,880	710	144	190	820	440	1,070	3,520
7	1,220	......	......	6,930	2,060	940	144	144	820	440	1,070	4,990
8	1,380	......	......	11,100	1,880	940	144	104	710	370	5,790	3,990
9	......	......	......	6,930	2,250	710	144	104	610	370	4,230	3,290
10	......	......	......	5,250	2,250	610	370	190	610	370	3,290	2,640
11	......	......	......	4,480	1,880	610	300	2,250	520	440	2,640	2,250
12	......	......	......	3,750	1,540	520	300	1,220	520	440	2,440	2,060
13	......	......	......	3,990	1,880	520	240	710	520	440	2,060	1,540
14	......	......	......	3,520	1,710	520	300	610	440	370	1,880	1,540
15	......	......	......	3,290	1,540	440	370	440	370	370	1,880	1,540
16	......	......	23,800	10,500	1,540	440	300	440	520	370	1,540	1,380
17	......	......	8,810	10,100	3,520	440	240	370	520	300	1,380	1,220
18	......	......	7,850	8,490	3,290	440	710	440	440	300	1,220	1,070
19	......	......	8,170	10,800	2,640	370	820	610	440	300	1,070	1,540
20	......	......	8,170	8,170	2,440	370	520	710	520	370	1,070	3,520
21	......	......	7,850	5,790	2,250	300	370	610	440	370	940	2,440
22	......	1,270	4,730	4,480	1,880	300	440	1,220	370	370	940	2,060
23	......	......	3,290	4,230	1,880	300	370	1,380	370	370	820	1,880
24	......	......	3,290	3,750	1,540	300	300	2,060	440	6,350	820	1,880
25	......	......	2,850	3,990	1,540	300	240	1,380	710	5,790	1,380	1,880
26	......	......	2,060	3,070	1,220	240	240	1,540	820	3,750	1,380	1,540
27	......	......	2,060	2,850	1,070	240	240	1,220	710	2,850	1,070	1,540
28	......	......	4,730	2,850	940	240	190	940	610	2,250	1,070	1,380
29	......	......	11,800	2,440	820	190	190	820	520	2,060	940	1,540
30	......	......	11,800	4,990	1,380	190	240	820	520	1,710	940	1,540
31	......	......	6,930	......	1,220	......	240	610	......	1,380	......	4,480

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of East Branch of Delaware River at Hancock, N. Y., for 1912.

[Drainage area, 840 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			1,240	1.48	1.71	C.
February			1,010	1.20	1.29	C.
March	23,300		4,660	5.55	6.40	B.
April	19,800	2,440	6,480	7.71	8.60	A.
May	3,750	820	1,990	2.37	2.73	A.
June	940	190	517	.615	.69	A.
July	620	144	288	.343	.40	A.
August	2,250	104	714	.850	.98	A.
September	1,220	370	620	.738	.82	A.
October	6,350	300	1,150	1.37	1.58	A.
November	5,790	820	1,660	1.98	2.21	A.
December	8,170	820	2,490	2.96	3.41	A.
The year	23,300	104	1,900	2.26	30.82	

NOTE.—Discharge Jan. 9 to Mar. 15 estimated from one discharge measurement made during this period, climatologic records, and comparative run-off. It is assumed that the ice caused 1 foot of backwater during nearly the whole frozen season.

DELAWARE RIVER AT PORT JERVIS, N. Y.

Location.—At the toll bridge at Port Jervis, 6 miles below the mouth of Mongaup River and 1 mile above the mouth of Neversink River, both entering from the north.

Records available.—October 12, 1904, to December 31, 1912. Data published also in the annual reports of the New York State engineer and surveyor.

Drainage area.—3,250 square miles.

Gage.—Standard chain, fastened to downstream side of bridge; read once daily. Considerable difficulty has been experienced in maintaining the datum of the gage. On September 4, 1908, in order to avoid negative readings, a change of about 2 feet was made in the original datum, as nearly as could be determined. The elevation of the datum of the gage is 414.89 feet above mean sea level. A correction varying from +1.7 to +2.0 has been applied to gage heights previous to September 4, 1908, so that all gage heights published by the Survey are referred to the same datum.

Channel.—Bed composed of gravel; banks high; seldom overflowed.

Discharge measurements.—Made from the highway bridge, except at low stages, when the left channel is sometimes measured by wading.

Winter flow.—Relation of gage height to discharge is usually not greatly affected by ice, except during severe winters. Ice jams sometimes occur at this station and the left channel is particularly subject to effect from ice.

Accuracy.—Conditions of flow at this point are constant and a good discharge rating curve has been developed for all stages. Careful comparison of records at this station with those obtained at Riegelsville and the two Hancock stations indicate that all the discharge data are reliable.

Cooperation.—Station established for the United States Weather Bureau by Irving Righter, city engineer of Port Jervis. Gage heights supplied to the Geological Survey by the Weather Bureau.

Discharge measurements of Delaware River at Port Jervis, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 29[a]	Frank Weber	1.36	557
Nov. 22	....do	3.01	2,880

[a] Made by wading.

Daily gage height, in feet, of Delaware River at Port Jervis, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.9	......	......	7.5	6.2	3.2	1.5	1.4	2.0	2.9	4.6	3.0
2	3.9	......	......	7.8	5.6	3.3	1.5	1.3	2.3	2.7	3.5	2.9
3	3.7	......	......	10.2	5.2	3.5	1.4	1.3	3.3	2.6	3.7	3.2
4	3.4	......	......	8.7	4.8	3.2	1.4	1.3	3.3	2.6	3.7	6.8
5	3.3	......	......	7.2	4.6	3.1	1.2	1.2	3.0	2.5	3.3	6.0
6	2.9	......	......	6.4	4.2	2.9	1.4	1.1	3.0	2.3	3.2	5.0
7	2.7	......	......	6.3	4.4	3.5	1.3	1.3	2.8	2.2	3.0	6.1
8	2.5	......	......	7.2	4.4	3.1	1.4	1.3	2.6	2.2	3.4	5.5
9	2.7	......	......	7.5	5.0	2.9	1.3	1.4	2.5	2.1	5.9	5.0
10	2.7	......	......	6.3	4.9	2.7	1.3	1.4	2.4	2.1	5.1	4.6
11	3.0	......	......	5.8	4.6	2.6	1.3	3.2	2.2	2.1	4.8	4.3
12	3.0	......	......	5.6	4.5	2.5	1.2	2.5	1.8	2.1	4.6	4.1
13	......	......	......	5.2	4.2	2.4	1.5	2.9	1.8	2.1	4.0	3.9
14	......	......	6.0	5.3	4.1	2.3	1.4	2.5	1.7	2.0	3.9	3.6
15	......	......	6.3	5.0	4.0	2.3	1.3	2.2	1.6	2.1	3.9	3.3
16	......	......	10.2	5.4	3.8	2.3	1.6	2.0	1.5	2.0	3.6	3.0
17	......	......	9.1	7.8	4.8	2.3	1.6	2.0	1.9	2.0	3.5	3.5
18	......	......	7.6	7.1	5.1	2.2	2.0	2.1	2.0	1.9	3.3	3.3
19	......	......	7.6	8.2	4.8	2.2	2.0	2.3	2.0	1.9	3.1	3.4
20	......	......	7.3	8.1	4.5	2.1	2.3	2.5	2.1	1.9	3.0	4.8
21	......	......	7.2	7.8	4.1	2.0	1.8	2.4	2.2	1.9	3.0	4.3
22	......	......	6.0	6.1	3.9	2.0	1.8	2.3	2.2	1.9	3.0	4.3
23	......	......	5.7	5.7	3.9	1.9	1.8	2.6	2.0	2.0	2.9	3.9
24	......	......	5.3	5.6	3.6	1.8	1.6	2.8	2.0	4.8	2.8	3.7
25	......	......	5.2	5.1	3.6	1.8	1.6	3.1	3.2	7.5	3.2	3.7
26	......	......	5.0	4.9	3.5	1.7	1.5	3.0	4.3	6.5	3.6	3.5
27	......	......	4.5	4.7	3.3	1.6	1.4	2.8	4.0	5.4	3.5	3.5
28	......	......	4.6	4.6	3.0	1.6	1.3	2.5	3.7	4.8	3.4	3.7
29	......	......	6.3	4.4	2.8	1.5	1.3	2.4	3.3	4.5	3.3	3.5
30	......	......	10.6	7.0	3.1	1.5	1.4	2.3	3.2	4.2	3.1	3.4
31	......	......	8.2	......	3.3	......	1.4	2.1	......	4.4	......	4.3

NOTE.—Relation of gage height to discharge affected by ice Jan. 13 to Mar. 13.

Daily discharge, in second-feet, of Delaware River at Port Jervis, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,440	......	......	23,900	15,700	3,320	665	590	1,150	2,650	8,100	2,860
2	5,440	......	......	26,000	12,500	3,580	665	520	1,570	2,260	4,150	2,650
3	4,770	......	......	44,400	10,700	4,150	590	520	3,580	2,080	4,770	3,320
4	3,860	......	......	32,700	8,930	3,320	590	520	3,580	2,080	4,770	19,200
5	3,580	......	......	21,800	8,100	3,080	450	450	2,860	1,900	3,580	14,600
6	2,650	......	......	16,800	6,530	2,650	590	390	2,860	1,570	3,320	9,780
7	2,260	......	......	16,200	7,300	4,150	520	520	2,450	1,420	2,860	15,100
8	1,900	......	......	21,800	7,300	3,080	590	520	2,080	1,420	3,860	12,100
9	2,260	......	......	23,900	9,780	2,650	520	590	1,900	1,280	14,100	9,780
10	2,260	......	......	16,200	9,350	2,260	520	590	1,730	1,280	10,200	8,100
11	2,860	......	......	13,500	8,100	2,080	520	3,320	1,420	1,280	8,930	6,910
12	2,860	......	......	12,100	7,700	1,900	450	1,900	920	1,280	8,100	6,160
13	......	......	......	10,700	6,530	1,730	665	2,650	920	1,280	5,800	5,440
14	......	......	14,600	11,100	6,160	1,570	590	1,900	825	1,150	5,440	4,450
15	......	......	16,200	9,780	5,800	1,570	520	1,420	740	1,280	5,440	3,580
16	......	......	44,400	11,600	5,100	1,570	740	1,150	665	1,150	4,450	2,860
17	......	......	35,800	26,000	8,930	1,570	740	1,150	1,030	1,150	4,150	4,150
18	......	......	24,600	21,200	10,200	1,420	1,150	1,280	1,150	1,030	3,580	3,580
19	......	......	24,600	29,000	8,930	1,420	1,150	1,570	1,150	1,030	3,080	3,860
20	......	......	22,500	28,200	7,700	1,280	1,570	1,900	1,280	1,030	2,860	8,930
21	......	......	21,800	26,000	6,160	1,150	920	1,730	1,420	1,030	2,860	6,910
22	......	......	14,600	15,100	5,440	1,150	920	1,570	1,420	1,030	2,860	6,910
23	......	......	13,000	13,000	5,440	1,030	920	2,080	1,150	1,150	2,650	5,440
24	......	......	11,100	12,500	4,450	920	740	2,450	1,150	8,930	2,450	4,770
25	......	......	10,700	10,200	4,450	920	740	3,080	3,320	23,900	3,320	4,770
26	......	......	9,780	9,350	4,150	825	665	2,860	6,910	18,400	4,450	4,150
27	......	......	7,700	8,510	3,580	740	590	2,450	5,800	11,600	4,150	4,150
28	......	......	8,100	8,100	2,860	740	520	1,900	4,770	8,930	3,860	4,770
29	......	......	16,200	7,300	2,450	665	520	1,730	3,580	7,700	3,580	4,150
30	......	......	47,600	20,500	3,080	665	590	1,570	3,320	6,530	3,080	3,860
31	......	......	29,000	......	3,580	......	590	1,280	......	7,300	......	6,910

NOTE.—Discharge determined from a well-defined rating curve, differing somewhat from the curve previously used.

Monthly discharge of Delaware River at Port Jervis, N. Y., for 1912.

[Drainage area, 3,250 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			2,950	0.914	1.05	B.
February			3,330	1.02	1.10	C.
March	47,600		14,400	4.43	5.11	B.
April	44,400	7,300	18,200	5.60	6.25	A.
May	15,700	2,450	7,000	2.15	2.48	A.
June	4,150	665	1,910	.588	.66	A.
July	1,570	450	694	.214	.25	A.
August	3,320	390	1,490	.458	.53	A.
September	6,910	665	2,220	.683	.76	A.
October	23,900	1,030	4,040	1.24	1.43	A.
November	14,100	2,450	4,830	1.49	1.66	A.
December	19,200	2,650	6,590	2.03	2.34	A.
The year	47,600	390	5,640	1.74	23.62	

NOTE.—Discharge Jan. 13 to Mar. 13, inclusive, estimated by comparison with the station at Riegelsville, taking climatologic conditions into consideration.

DELAWARE RIVER AT RIEGELSVILLE, N. J.

Location.—At the toll suspension bridge between Riegelsville, N. J., and Riegelsville, Pa., 9 miles below the mouth of Lehigh River (entering from the west) and 600 feet above the mouth of the Musconetcong (entering from the east).

Records available.—July 3, 1906, to December 31, 1912.

Drainage area.—6,430 square miles.

Gage.—Chain, attached to the bridge; datum unchanged.

Channel.—The station is in a deep hole which extends about half a mile downstream to a permanent control composed of bowlders averaging 2 to 3 feet in diameter; immediately below the control are heavy rapids. Both banks are high and not subject to overflow.

Discharge measurements.—Made from the bridge. No measurements in 1912.

Winter flow.—Relation between gage height and discharge affected by ice only during severe winters.

Diversions.—The Delaware division of the Pennsylvania Canal, running from Easton, Pa., to Bristol, Pa., diverts water from the Lehigh at its mouth and at low stages takes practically the entire discharge of this tributary. The water is turned out of this canal during the winter period, or from about the middle of December to the last of March, but throughout the remainder of the year the average discharge is 250 to 300 second-feet.

Accuracy.—Conditions for obtaining accurate discharge data are very good, and an excellent discharge rating curve has been developed. The relation between gage height and discharge is affected by backwater from the Musconetcong only at rare intervals. Comparison of the records of flow with those at Port Jervis, N. Y., and Hancock, N. Y., show that full reliance can be placed on the estimates of monthly discharge at Riegelsville.

Daily discharge, in second-feet, of Delaware River at Riegelsville, N. J., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.7	3.4	6.1	11.6	9.5	4.5	2.5	2.2	2.65	4.1	4.9	4.1
2	5.4	3.5	5.4	11.9	8.4	4.2	2.5	2.15	2.85	4.0	5.3	4.1
3	5.4	3.3	4.9	13.1	7.7	4.3	2.4	2.2	3.2	3.7	5.0	5.3
4	5.4	3.3	4.6	14.2	7.1	4.4	2.4	2.15	3.8	3.6	4.9	7.6
5	4.7	3.2	4.5	11.2	6.4	4.2	2.35	2.2	3.7	3.5	4.6	7.6
6	3.8	3.1	4.1	9.8	6.3	4.2	2.4	2.15	3.4	3.3	4.4	7.0
7	3.8	3.2	4.2	9.2	6.4	4.4	2.4	2.05	3.3	3.2	4.3	7.7
8	3.8	3.2	4.4	9.9	7.4	4.3	2.4	2.05	3.5	3.1	6.1	7.8
9	3.7	3.1	4.5	11.0	7.8	4.1	2.4	2.05	3.3	3.0	7.3	7.0
10	3.7	2.85	4.4	9.5	7.9	3.9	2.3	2.15	3.1	2.95	7.4	6.3
11	3.8	3.0	4.9	8.5	7.3	3.7	2.35	3.8	2.9	3.2	7.6	5.8
12	4.2	2.9	5.0	7.9	6.9	3.5	2.55	4.8	2.75	3.3	6.1	5.6
13	4.0	2.9	12.2	7.5	6.4	3.4	2.45	3.9	2.75	3.0	5.6	5.0
14	3.8	2.9	10.1	7.4	6.1	3.3	2.4	3.7	2.6	3.1	5.5	4.7
15	4.0	2.95	12.2	7.2	6.0	3.3	2.6	3.2	2.55	3.0	5.3	4.4
16	3.8	2.95	17.4	7.1	5.9	3.3	2.6	3.1	3.1	2.9	5.1	4.6
17	3.9	3.0	16.9	9.8	7.5	3.4	2.5	2.85	3.2	2.8	4.8	4.7
18	4.0	3.0	12.8	10.8	7.9	3.3	2.7	2.75	2.9	2.75	4.6	4.5
19	4.2	3.2	11.9	12.3	7.3	3.2	2.6	3.0	2.95	2.7	4.4	4.8
20	4.5	3.4	11.5	12.0	6.8	3.2	2.75	3.6	3.0	2.65	4.3	5.7
21	4.4	4.0	11.2	10.6	6.4	3.1	2.95	3.5	3.0	2.7	4.2	6.5
22	4.3	3.7	9.8	9.3	5.9	2.9	2.95	3.3	2.95	2.7	4.1	5.7
23	4.4	5.3	8.7	8.6	5.6	2.85	2.7	3.3	2.85	3.4	4.0	5.3
24	4.5	5.2	8.7	8.2	5.4	2.9	2.65	3.3	2.85	6.1	4.1	5.1
25	4.2	5.7	9.0	7.7	5.2	2.85	2.6	3.4	5.2	9.7	4.9	4.6
26	3.9	5.9	8.4	7.3	5.0	2.85	2.4	3.6	6.4	9.5	4.8	4.4
27	3.8	8.1	7.7	6.9	4.8	2.85	2.3	3.3	6.2	8.0	4.8	4.8
28	3.6	6.8	7.8	6.8	4.5	2.75	2.25	3.2	5.6	6.9	4.6	5.5
29	3.6	6.3	9.2	6.4	4.4	2.65	2.2	3.1	4.8	6.3	4.4	5.0
30	3.6	....	15.4	7.9	4.6	....	2.2	2.85	4.5	5.7	4.2	5.2
31	3.6	....	14.0	....	4.6	....	2.2	2.75	....	5.2	....	7.1

NOTE.—Relation of gage height to discharge not affected by ice during 1912. Water turned into the canal Mar. 25 and withdrawn Dec. 9.

Daily discharge, in second-feet, of Delaware River at Riegelsville, N. J., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12,000	4,530	13,500	41,800	29,300	7,830	2,400	1,830	2,700	6,560	9,160	6,560
2	10,900	4,800	10,900	43,800	23,500	6,870	2,400	1,740	3,140	6,250	10,500	6,560
3	10,900	4,260	9,160	51,800	20,200	7,190	2,200	1,830	4,000	5,360	9,500	10,500
4	10,900	4,260	8,160	59,500	17,500	7,510	2,200	1,740	5,650	5,080	9,160	19,700
5	8,490	4,000	7,830	39,300	14,600	6,870	2,100	1,830	5,360	4,800	8,160	19,700
6	5,650	3,750	6,560	31,000	14,200	6,870	2,200	1,740	4,530	4,260	7,510	17,100
7	5,650	4,000	6,870	27,700	14,600	7,510	2,200	1,580	4,260	4,000	7,190	20,200
8	5,650	4,000	7,510	31,600	18,800	7,190	2,200	1,580	4,800	3,750	13,500	20,700
9	5,360	3,750	7,830	38,100	20,700	6,560	2,200	1,580	4,260	3,500	18,400	17,100
10	5,360	3,140	7,510	29,300	21,100	5,950	2,010	1,740	3,750	3,380	18,800	14,200
11	5,650	3,500	9,160	24,000	18,400	5,360	2,100	5,650	3,260	4,000	19,700	12,400
12	6,870	3,260	9,500	21,100	16,700	4,800	2,500	8,820	2,920	4,260	13,500	11,600
13	6,250	3,260	45,700	19,300	14,600	4,530	2,300	5,950	2,920	3,500	11,600	9,500
14	5,650	3,260	32,700	18,800	13,500	4,260	2,200	5,360	2,600	3,750	11,200	8,490
15	6,250	3,380	45,700	18,000	13,100	4,260	2,600	4,000	2,500	3,500	10,500	7,510
16	5,650	3,380	83,000	17,500	12,700	4,260	2,600	3,750	3,750	3,260	9,840	8,160
17	5,950	3,500	79,300	31,000	19,300	4,530	2,400	3,140	4,000	3,030	8,820	8,490
18	6,250	3,500	49,700	36,900	21,100	4,260	2,810	2,920	3,260	2,920	8,160	7,830
19	6,870	4,000	43,800	46,400	18,400	4,000	2,600	3,500	3,380	2,810	7,510	8,820
20	7,830	4,530	44,200	44,400	16,300	4,000	2,920	5,080	3,500	2,700	7,190	12,000
21	7,510	6,250	39,300	35,700	14,600	3,750	3,380	4,800	3,500	2,810	6,870	15,000
22	7,190	25,000	31,000	28,200	12,700	3,260	3,380	4,260	3,380	2,810	6,560	12,000
23	7,510	10,500	25,000	24,500	11,600	3,140	2,810	4,260	3,140	4,530	6,250	10,500
24	7,830	10,200	25,000	22,600	10,900	3,260	2,700	4,260	3,140	13,500	6,560	9,840
25	6,870	12,000	26,600	20,200	10,200	3,140	2,600	4,530	10,200	30,400	9,160	8,160
26	5,950	12,700	23,500	18,400	9,500	3,140	2,200	5,080	14,600	29,300	8,820	7,510
27	5,650	22,100	20,200	16,700	8,820	3,140	2,010	4,260	13,900	21,600	8,820	8,820
28	5,080	16,300	20,700	16,300	7,830	2,920	1,920	4,000	11,600	16,700	8,160	11,200
29	5,080	14,200	27,700	14,600	7,510	2,700	1,830	3,750	8,820	14,200	7,510	9,500
30	5,080	....	68,200	21,100	8,160	2,550	1,830	3,140	7,830	12,000	6,870	10,200
31	5,080	....	58,100	....	8,160	....	1,830	2,920	....	10,200	....	17,500

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Delaware River at Riegelsville, N. J., for 1912.

[Drainage area, 6,430 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	12,000	5,080	6,870	1.07	1.23	A.
February	25,000	3,140	7,080	1.10	1.19	A.
March	83,000	6,560	28,800	4.49	5.18	A.
April	59,500	14,600	29,700	4.65	5.19	A.
May	29,300	7,510	15,100	2.40	2.77	A.
June	7,830	2,550	4,850	.796	.89	A.
July	3,380	1,830	2,380	.412	.48	A.
August	8,820	1,580	3,570	.597	.69	A.
September	14,600	2,500	5,160	.843	.94	A.
October	30,400	2,700	7,700	1.24	1.43	A.
November	19,700	6,250	9,850	1.57	1.75	A.
December	20,700	6,560	11,800	1.85	2.13	A.
The year	83,000	1,580	11,100	1.76	23.87	

NOTE.—In order to determine the discharge per square mile and the run-off depth in inches, 270 second-feet were added Mar. 25 to Dec. 8, 1912, before computing the discharge per square mile. Hence the first three columns indicate the actual quantity of water available in the river, and the two remaining columns represent the actual run-off from the drainage area above Riegelsville, including the discharge of the canal.

WEST BRANCH OF DELAWARE RIVER AT HALE EDDY, N. Y.

Location.—At highway bridge 400 feet west of the Erie Railroad station in the village of Hale Eddy, 8½ miles above junction with East Branch at Hancock, 8 miles below the power dam of the Deposit Electric Co.

Records available.—November 15 to December 31, 1912.

Drainage area.—611 square miles (Post Route Map).

Gage.—A vertical staff gage in four sections.

Channel.—Bed of stream consists of coarse gravel and bowlders. The control is about three-fourths mile below the gage and is apparently permanent. Between the control and the gage there is low land behind the left bank which is overflowed by extreme high water.

Discharge measurements.—Made by wading across three channels above the bridge or one below, in low water. High-water measurements may be made from highway bridge.

Winter flow.—Gage heights seriously affected by ice during the winter months.

Accuracy.—Discharge rating curve well defined. Good conditions for meter measurements.

The following discharge measurement was made by Frank Weber:

November 21, 1912: Gage height, 2.99 feet; discharge, 646 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of West Branch of Delaware River at Hale Eddy, N. Y., for 1912.

[William Seeley, observer.]

Day.	November.		December.		Day.	November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
1			2.7	470	16	3.25	775	3.3	805
2			3.1	685	17	3.25	775	3.05	658
3			6.6	3,560	18	3.2	745	3.05	658
4			5.6	2,590	19	3.05	658	3.6	1,000
5			5.4	2,410	20	3.0	630	4.7	1,820
6			5.6	2,590	21	2.85	548	4.0	1,280
7			5.4	2,410	22	2.65	447	3.8	1,140
8			4.8	1,900	23	2.65	447	3.7	1,070
9			4.4	1,580	24	2.65	447	3.4	870
10			4.0	1,280	25	3.0	630	3.45	902
11			3.9	1,210	26	3.05	658	3.15	715
12			3.6	1,000	27	3.05	658	3.45	902
13			3.1	685	28	2.9	575	3.05	658
14			3.15	715	29	2.85	548	2.95	602
15	3.5	935	3.3	805	30	2.65	447	3.25	775
					31			5.10	2,160

NOTE.—Daily discharge determined from a well defined rating curve based on measurements made during 1912 and 1913.

Monthly discharge of West Branch of Delaware River at Hale Eddy, N. Y., for 1912.

[Drainage area, 611 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
November 15-30	935	447	620	1.01	0.60	B
December	3,560	470	1,290	2.11	2.43	B

WEST BRANCH OF DELAWARE RIVER AT HANCOCK, N. Y.

Location.—At the toll suspension bridge over Delaware River half a mile west of the Erie Railroad station at Hancock, N. Y., about 1 mile above the junction of the East and West branches of the Delaware, and about 10 miles below the mouth of Oquaga Creek, the nearest tributary, which enters from the right.

Records available.—October 15, 1902, to December 31, 1912. Data published also in annual reports of the New York State engineer and surveyor.

Drainage area.—660 square miles.[1]

Gage.—Standard chain, fastened to the upstream side of the bridge; read once daily; datum unchanged.

Channel.—Bed of river composed of gravel; one channel at all stages.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—Affected considerably by ice below the control point.

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[1] Revised value.

Accuracy.—Conditions for determination of discharge not good. High-water stage affected by backwater from East Branch; low-water stage controlled by riffles about 800 feet below the bridge; frequent changes in the channel require many measurements and frequent new discharge rating curves.

Cooperation.—Maintained since January 1, 1908, in cooperation with the United States Weather Bureau.

Discharge measurements of West Branch of Delaware River at Hancock, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 23[a]	C. S. De Golyer	5.99	1,670
July 27[b]	Frank Weber	2.58	67.8
27[b]	do	2.58	68.7
Nov. 21	do	3.71	658

[a] Measurement under partial ice cover. [b] Wading three-fourths mile above the gage.

Daily gage height, in feet, of West Branch of Delaware River at Hancock, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	4.0	5.5	7.2	4.5	3.5	2.4	2.5	3.0	3.5	3.5	3.3
2	3.4	4.0	5.6	7.2	4.6	3.3	2.6	2.5	4.3	3.5	4.1	3.5
3	3.6	3.9	5.6	8.2	4.4	3.5	2.4	2.5	3.9	3.3	3.9	6.2
4	3.5	3.9	5.4	6.6	4.2	3.5	2.5	2.5	3.7	3.3	3.6	5.7
5	3.5	3.9	5.1	6.1	4.1	3.5	2.5	2.5	3.5	3.2	3.5	5.3
6	2.9	3.7	5.4	6.0	4.0	3.5	2.5	2.5	3.4	3.1	3.5	5.5
7	3.4	3.7	5.2	6.1	4.1	3.6	2.5	2.5	3.3	3.1	3.5	5.6
8	4.0	3.8	5.1	7.2	4.1	3.5	2.5	2.5	3.2	3.0	6.9	5.1
9	4.6	3.6	6.0	6.1	4.2	3.4	2.5	2.5	3.2	2.9	5.9	4.7
10	4.7	3.6	6.0	5.7	4.1	3.2	2.5	2.5	3.0	3.0	5.3	4.2
11	4.7	3.5	5.6	5.5	3.9	3.1	2.5	3.4	2.9	3.0	4.9	4.3
12	4.7	3.5	5.2	5.3	3.8	3.2	2.6	3.1	3.0	3.1	4.6	4.0
13	4.6	3.6	7.2	5.5	3.8	3.0	2.5	2.9	3.0	3.0	4.4	3.6
14	4.4	3.7	10.8	5.2	3.7	3.0	2.6	2.9	2.9	3.0	4.4	3.5
15	4.7	3.5	5.5	5.0	3.7	3.0	2.6	2.8	2.9	2.9	4.2	3.9
16	4.5	3.5	10.0	7.6	3.6	3.0	2.6	2.8	2.9	2.9	4.0	3.8
17	4.5	3.6	6.8	7.0	4.2	3.1	2.5	2.7	2.9	2.9	4.0	3.7
18	4.5	3.6	6.8	7.1	4.6	3.0	2.6	2.7	3.0	2.8	3.8	3.7
19	4.6	3.8	6.7	7.4	4.3	3.0	2.8	3.0	3.2	2.9	3.7	4.0
20	4.7	3.8	6.9	6.8	4.1	2.8	2.6	3.1	3.2	2.9	3.7	5.0
21	5.2	4.1	6.0	6.0	4.1	2.8	2.5	3.0	3.1	2.9	3.6	4.4
22	4.9	4.8	5.3	6.0	4.1	2.7	2.5	3.3	3.0	2.9	3.5	4.2
23	4.7	6.0	5.0	5.5	3.9	2.7	2.5	3.3	3.0	3.0	3.5	4.0
24	4.6	5.5	4.9	5.4	3.8	2.9	2.5	3.6	3.1	5.5	3.4	3.8
25	4.5	5.4	4.5	5.2	3.7	2.7	2.5	3.3	4.0	6.3	3.5	4.0
26	4.4	6.0	4.1	5.1	3.6	2.6	2.4	3.6	3.9	5.3	3.7	3.8
27	4.3	6.0	4.2	4.8	3.5	2.6	2.5	3.2	3.8	5.2	3.7	3.9
28	4.3	6.5	4.3	4.7	3.4	2.5	2.5	3.0	3.5	4.4	3.6	3.6
29	4.2	6.0	6.8	4.4	3.4	2.8	2.6	3.0	3.3	4.2	3.5	3.5
30	4.2		8.2	4.0	3.5	2.5	2.6	3.0	3.5	4.0	3.4	3.9
31	4.2		6.5		3.6		2.6	2.9		3.8		4.8

NOTE.—Relation of gage height to discharge affected by ice Jan. 7 to Mar. 15.

Daily discharge, in second-feet, of West Branch of Delaware River at Hancock, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	918			7,090	1,420	506	28	50	225	506	506	380
2	440			7,090	1,530	380	76	50	1,210	506	1,010	506
3	576			10,400	1,310	506	28	50	826	380	826	4,390
4	506			5,390	1,110	506	50	50	652	380	576	3,310
5	506			4,160	1,010	506	50	50	506	324	506	2,570
6	182			3,940	918	506	50	50	440	272	506	2,930
7				4,160	1,010	576	50	50	380	272	506	3,120
8				7,090	1,010	506	50	50	324	225	6,210	2,230
9				4,160	1,110	440	50	50	324	182	3,720	1,650
10				3,310	1,010	324	50	50	225	225	2,570	1,110
11				2,930	826	272	50	440	182	225	1,920	1,210
12				2,570	736	324	76	272	225	272	1,530	918
13				2,930	736	225	50	182	225	225	1,310	576
14				2,400	652	225	76	182	182	225	1,310	506
15				2,070	652	225	76	142	182	182	1,110	826
16			17,100	8,360	576	225	76	142	182	182	918	736
17			5,930	6,500	1,110	272	50	106	182	182	918	652
18			5,930	6,790	1,530	225	76	106	225	142	736	652
19			5,660	7,720	1,210	225	142	225	324	182	652	918
20			6,210	5,930	1,010	142	76	272	324	182	652	2,070
21			3,990	3,940	1,010	142	50	225	272	182	576	1,310
22			2,570	3,940	1,010	106	50	380	225	182	506	1,110
23		1,670	2.070	2,980	826	106	50	380	225	225	506	918
24			1,920	2,750	736	182	50	576	272	2,930	440	736
25			1,420	2,400	652	106	50	380	918	4,630	506	918
26			1,010	2,230	576	76	28	576	826	2,570	652	736
27			1,110	1,780	506	76	50	324	736	2,400	652	826
28			1,210	1,650	440	50	50	225	506	1,310	576	576
29			5,930	1,310	440	76	76	225	380	1,110	506	506
30			10,400	918	506	50	76	225	506	918	440	826
31			5,130		576		76	182		736		1,780

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of West Branch of Delaware River at Hancock, N. Y., for 1912.

[Drainage area, 660 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			523	0.792	0.91	C.
February			528	.800	.86	C.
March	17,100		3,600	5.45	6.28	B.
April	10,400	918	4,290	6.50	7.25	A.
May	1,530	440	895	1.36	1.57	A.
June	576	50	270	.409	.46	A.
July	142	28	59.2	.090	.10	B.
August	576	50	202	.306	.35	A.
September	1,210	182	407	.617	.69	A.
October	4,630	182	725	1.10	1.27	A.
November	6,210	440	1,110	1.68	1.87	A.
December	4,390	380	1,340	2.03	2.34	A.
The year	17,100	28	1,160	1.76	23.95	

NOTE.—Discharge for the period during which ice existed—Jan. 7 to Mar. 15—estimated from one measurement taken during the period, climatologic records, and comparison with records for other stations: Jan. 8–31, 525 second-feet; Mar 1–15, 2,270 second-feet.

MONGAUP RIVER AT RIO, N. Y.

Location.—At the steel highway bridge on Partridge ranch, near Rio, 6 miles above Mongaup village and some 7 miles above the mouth of the stream.

Records available.—August 8, 1909, to December 31, 1912. Data also in annual report of New York State engineer and surveyor.

Drainage area.—189 square miles.

Gage.—Standard chain, attached to the downstream side of the bridge; read twice daily; datum unchanged.

Channel.—At low and medium stages divided into two parts by an island just below the bridge. Banks high and overflow only during high stages.

Discharge measurements.—At high stages made from the bridge; at low stages by wading.

Accuracy.—Conditions fairly good except at low-water stages, when the current becomes rather sluggish. A good discharge rating curve has been developed for stages below 3 feet.

The following discharge measurement was made by Frank Weber:

July 30, 1912: Gage height, 0.70 foot; discharge, 41.6 second-feet.

Daily gage height, in feet, of Mongaup River at Rio, N. Y., for 1912.

[Mrs. C. S. Rolles, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.65	......	......	2.9	2.7	1.32	0.89	0.80	1.04	1.22	1.48	1.31
2	1.6	......	......	2.9	2.3	1.25	.85	.74	1.25	1.24	1.6	1.34
3	1.65	......	......	3.8	2.2	2.3	.82	.76	1.34	1.16	1.48	2.30
4	1.6	......	2.0	2.9	2.1	......	.90	.79	1.14	1.12	1.42	1.9
5	1.55	......	1.8	2.6	1.85	1.55	.86	.74	1.06	1.14	1.31	1.7
6	1.6	......	1.55	2.4	1.9	1.5	.84	.71	1.01	1.09	1.28	2.1
7	1.5	......	1.15	2.35	1.95	1.8	.80	.71	.92	1.01	1.81	2.1
8	1.65	......	1.02	2.9	2.15	1.55	.76	.71	1.02	.95	2.0	1.6
9	1.8	......	1.9	2.45	2.4	1.38	.74	.74	.95	1.14	1.7	1.7
10	1.8	......	1.95	2.25	2.2	1.29	.72	.79	.91	1.05	1.55	1.65
11	1.8	......	1.7	2.15	1.95	1.24	.74	2.35	.92	1.09	1.5	1.55
12	1.85	......	1.7	2.10	1.8	1.21	.74	1.50	.90	1.10	1.41	1.49
13	2.35	......	3.6	2.05	1.8	1.21	.72	1.05	.90	1.11	1.42	1.35
14	2.25	......	3.1	2.0	1.7	1.15	.88	1.20	.85	1.08	1.5	1.49
15	2.1	......	3.2	2.05	2.0	1.12	.88	1.00	.85	1.01	1.46	1.35
16	2.0	......	4.5	......	2.3	1.15	.83	.95	.88	1.01	1.39	1.4
17	......	......	3.2	2.35	2.0	1.09	.80	1.42	.86	.95	1.38	1.38
18	......	......	3.0	3.0	1.8	1.11	1.00	1.15	.94	.89	1.34	1.34
19	......	......	2.8	3.0	1.7	1.05	.98	1.42	1.15	.91	1.28	2.25
20	......	......	2.6	2.7	1.65	1.02	.84	1.30	1.14	.96	1.38	2.1
21	......	......	2.25	2.35	1.6	1.06	.85	1.12	1.01	.96	1.28	1.9
22	......	......	2.3	2.1	1.6	1.02	1.02	1.20	1.04	.92	1.26	1.75
23	......	......	1.95	2.25	1.48	.94	.95	1.05	1.01	1.35	1.22	1.7
24	......	......	2.05	2.1	1.43	.95	.76	1.14	1.18	2.8	1.36	1.6
25	......	......	2.2	2.1	1.45	.95	.84	1.04	2.05	2.6	1.7	1.55
26	......	......	1.95	1.9	1.7	.94	.84	.99	1.7	2.25	1.6	1.6
27	......	......	2.0	2.0	1.55	.98	.81	.96	1.45	1.95	1.5	1.7
28	......	......	2.2	1.9	1.40	.88	.80	1.04	1.32	1.8	1.42	1.8
29	......	......	4.2	1.8	1.42	.90	.79	1.00	1.28	1.7	1.40	1.65
30	......	......	3.60	3.2	1.65	.89	.75	.91	1.26	1.6	1.38	1.7
31	......	......	3.0	......	1.38	......	.72	.99	......	1.5	......	2.5

NOTE.—Relation of gage height to discharge affected by ice, Jan. 8 to Mar. 3.

Daily discharge, in second-feet, of Mongaup River at Rio, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	370	....	100	1,180	1,020	228	84	63	129	192	292	224
2	345	....	200	1,180	740	202	74	52	202	199	345	236
3	370	....	300	2,010	680	740	68	55	236	171	292	740
4	345	....	560	1,180	620	530	86	61	164	157	268	500
5	322	....	445	950	472	322	77	52	136	164	224	395
6	345	....	322	810	500	300	72	46	118	146	213	620
7	300	....	168	775	530	445	63	46	92	118	224	620
8	....	....	122	1,180	650	322	55	46	122	100	560	345
9	....	....	500	845	810	252	52	52	100	164	395	395
10	....	....	530	710	680	216	48	61	89	132	322	370
11	....	....	395	650	530	199	52	775	92	146	300	322
12	....	....	395	620	445	188	52	300	86	150	264	296
13	....	....	1,810	590	445	188	48	132	86	154	268	240
14	....	....	1,350	560	395	168	81	185	74	143	300	292
15	....	....	1,440	590	560	157	81	115	74	118	284	240
16	....	....	2,790	680	740	168	70	100	81	118	256	260
17	....	....	1,440	775	560	146	63	268	77	100	252	252
18	....	....	1,260	1,260	445	154	115	168	98	84	236	236
19	....	....	1,100	1,260	395	132	109	268	168	89	213	710
20	....	....	950	1,020	370	122	72	220	164	103	252	620
21	....	....	710	775	345	136	74	157	118	103	213	500
22	....	....	740	620	345	122	122	185	129	92	206	420
23	....	....	530	710	292	98	100	132	118	240	192	395
24	....	....	590	620	272	100	55	164	178	1,100	244	345
25	....	....	680	620	280	100	72	129	590	950	395	322
26	....	....	530	500	395	98	72	112	395	710	345	345
27	....	....	560	560	322	109	65	103	280	530	300	395
28	....	....	680	500	260	81	63	129	228	445	268	445
29	....	....	2,440	445	268	86	61	115	213	395	260	370
30	....	....	1,810	1,440	370	84	54	89	206	345	252	395
31	....	....	1,260	....	252	....	48	112	....	300	....	880

NOTE.—Daily discharge determined from a rating curve well defined below 1,000 second-feet. Discharge Mar. 1—3 estimated. Discharge Apr. 16 and June 4 interpolated

Monthly discharge of Mongaup River at Rio, N. Y., for 1912.

[Drainage area, 189 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March	2,790	....	862	4.56	5.26	B.
April	2,010	445	854	4.52	5.04	A.
May	1,020	252	483	2.56	2.95	A.
June	740	81	206	1.09	1.22	A.
July	122	48	71	.376	.43	A.
August	775	46	145	.767	.88	A.
September	590	74	161	.852	.95	A.
October	1,100	84	257	1.36	1.57	A.
November	395	192	281	1.49	1.66	A.
December	880	224	410	2.17	2.50	A.

NEVERSINK RIVER AT GODEFFROY, N. Y.

Location.—At the suspension bridge half a mile east of the post office at Godeffroy, half a mile below the mouth of Brasher Kill (entering from the left), and 8 miles above the confluence of Neversink and Delaware rivers.

Records available.—August 4 to October 9, 1903; August 21 to December 25, 1909. Data also in the annual reports of the State engineer and surveyor of New York.

Drainage area.—314 square miles.

Gage.—Present gage, established August 1, 1910, standard chain, supported by a cantilever arm fastened to the left-hand downstream cable tower; datum of present gage (unchanged) is 0.98 foot lower than that of original gage washed out by flood October 9, 1903, and the same as that of second gage, an enameled staff bolted to the downstream end of left-hand abutment; destroyed by flood January 21, 1910; gage read twice daily, about 8 a. m. and 5 p. m.

Channel.—Bed of sand and gravel; liable to shift.

Artificial control.—There are several reservoirs in the upper part of the drainage area, two of which are now in use. The principal power plant is at Roses Point, near Cuddebackville, in the vicinity of the old Delaware & Hudson canal. About half a mile above this point a concrete dam diverts water through the old feeder ditch to the plant. This power plant supplies Port Jervis, Middletown, and other small places in the vicinity, with electric light and power. The low-water flow is controlled absolutely by the power plant. For this reason it is not advisable to attempt to estimate the daily discharge from semidaily gage readings at present. The gage reader's observations are being published, together with the rate of flow corresponding to each.

Accuracy.—Conditions are good for making measurements, but the channel is liable to shift from time to time, thus impairing the accuracy of the discharge rating curve. The curve for 1911 and 1912 is fairly good, and the accuracy of the records for these years depends on the accuracy of mean daily gage heights.

Discharge measurements of Neversink River at Godeffroy, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 31[a]	Frank Weber	2.79	58.7
Nov. 23	....do	3.45	298

[a] Made by wading.

Gage height, in feet, and discharge, in second-feet, of Neversink River at Godeffroy, N. Y., for 1911–12.

Day.	January.				February.				March.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1911.												
1	......	......	......	......	3.92	628	3.61	399	3.36	260	3.46	312
2	......	......	......	......	3.89	602	3.57	375	3.36	260	3.45	307
3	10.0	......	8.3	......	3.86	579	3.55	363	3.39	275	3.46	312
4	6.0	3,780	5.0	2,080	4.05	750	4.2	910	3.42	291	3.47	318
5	5.0	2,080	5.3	2,590	4.05	750	4.15	855	3.37	265	3.49	329
6	7.0	......	7.3	......	4.0	700	4.0	700	3.29	225	3.38	270
7	7.0	......	7.3	......	3.88	694	4.05	750	3.96	664	4.15	855
8	4.25	970	3.95	655	3.86	579	4.0	700	3.97	673	4.15	855
9	4.05	750	4.95	2,000	3.76	502	3.96	664	4.05	750	4.2	910
10	4.0	700	4.3	1,030	3.46	312	3.76	502	4.05	750	4.15	855
11	3.78	517	3.56	369	3.36	260	3.66	432	4.0	700	4.15	855
12	3.82	548	3.66	432	3.34	250	3.67	438	4.05	750	4.1	800
13	3.79	525	3.42	291	3.31	235	3.61	399	4.0	700	4.05	750
14	3.72	473	3.80	532	3.30	230	3.47	318	4.05	750	4.15	855
15	3.56	369	3.81	540	3.32	240	3.43	296	4.1	800	4.15	855

Gage height, in feet, and discharge, in second-feet, of Neversink River at Godeffroy, N. Y., for 1911–12—Continued.

Day.	January.				February.				March.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1911.												
16	3.60	392	3.86	579	3.29	225	3.46	312	4.05	750	4.15	855
17	3.56	369	4.05	750	3.31	235	3.45	307	4.05	750	4.15	855
18	3.66	432	4.1	800	3.33	245	3.51	340	4.0	700	4.1	800
19	3.55	363	4.1	800	3.36	260	3.54	357	3.97	673	4.1	800
20	3.36	260	4.0	700	3.39	275	3.56	369	4.25	970	4.75	1,680
21	3.81	540	3.61	399	3.38	270	3.55	363	4.75	1,680	4.95	2,000
22	3.79	525	3.46	312	3.39	275	3.57	375	4.85	1,840	5.0	2,080
23	3.72	473	3.56	369	3.35	255	3.53	351	4.95	2,000	5.9	3,610
24	3.64	418	3.87	587	3.34	250	3.52	346	3.96	664	4.45	1,230
25	3.61	399	3.72	473	3.32	240	3.51	340	4.9	1,920	4.35	1,100
26	3.59	386	3.76	502	3.36	260	3.54	357	4.85	1,840	4.4	1,160
27	3.55	363	3.47	318	3.44	302	3.69	451	4.8	1,760	4.45	1,230
28	3.58	380	3.66	432	3.58	380	3.75	495	5.4	2,760	6.8	......
29	3.76	502	3.56	369	......	......	......	......	5.3	2,590	6.7	......
30	3.82	548	3.54	357	......	......	......	......	5.4	2,760	5.6	3,100
31	3.88	604	3.56	369	......	......	......	......	5.2	2,420	5.5	2,930

Day.	April.				May.				June.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1911.												
1	5.2	2,420	5.4	2,760	4.25	970	4.5	1,300	2.69	40	2.97	102
2	5.1	2,250	5.3	2,590	4.45	1,230	4.85	1,840	2.64	33	3.01	113
3	5.1	2,250	5.3	2,570	4.25	970	4.75	1,680	2.66	35	2.98	104
4	5.1	2,250	5.3	2,590	4.45	1,230	4.05	750	2.69	40	3.03	120
5	5.0	2,080	5.3	2,590	4.45	1,230	4.5	1,300	3.43	296	3.91	619
6	5.0	2,080	5.3	2,590	4.55	1,380	4.75	1,680	3.63	412	3.90	610
7	5.0	2,080	5.2	2,420	4.5	1,300	4.7	1,600	3.82	548	4.1	800
8	5.3	2,590	5.4	2,760	4.25	970	4.55	1,380	3.84	563	4.05	750
9	5.0	2,080	5.1	2,250	4.2	910	4.5	1,300	3.76	502	3.95	655
10	4.35	1,100	4.3	1,030	4.15	855	4.45	1,230	3.69	451	3.89	602
11	4.65	1,520	4.75	1,680	4.15	855	4.4	1,160	3.73	480	3.91	619
12	4.15	855	4.25	970	4.1	800	4.4	1,160	......	......	......	......
13	4.25	970	4.4	1,160	4.15	855	4.4	1,160	......	......	......	......
14	4.65	1,520	4.75	1,680	4.1	800	4.4	1,160	......	......	......	......
15	4.6	1,450	4.65	1,520	4.1	800	4.35	1,100	......	......	......	......
16	4.55	1,380	4.6	1,450	4.1	800	4.4	1,160	......	......	......	......
17	4.6	1,450	4.7	1,600	3.74	488	3.92	628	......	......	......	......
18	4.6	1,450	4.65	1,520	3.75	495	3.90	610	......	......	......	......
19	4.6	1,450	4.7	1,600	3.72	473	3.91	619	......	......	......	......
20	4.55	1,380	4.65	1,520	3.64	418	3.89	602	......	......	......	......
21	4.55	1,380	4.65	1,520	3.04	124	3.19	180	......	......	......	......
22	4.55	1,380	4.65	1,520	2.54	20	2.94	93	......	......	......	......
23	4.5	1,300	4.6	1,450	2.34	4	2.74	48	......	......	......	......
24	4.5	1,300	4.6	1,450	2.24	1	2.54	20	......	......	......	......
25	4.5	1,300	4.6	1,450	2.84	68	3.83	555	......	......	......	......
26	4.45	1,230	4.55	1,380	2.54	20	2.84	68	......	......	......	......
27	4.5	1,300	4.55	1,380	2.34	4	2.44	10	......	......	......	......
28	4.55	1,380	4.65	1,520	2.74	48	2.94	93	......	......	......	......
29	4.55	1,380	4.7	1,600	2.70	41	2.95	96	......	......	......	......
30	4.6	1,450	4.7	1,600	2.68	38	2.98	104	......	......	......	......
31	......	......	......	......	2.66	35	3.00	110	......	......	......	......

Gage height, in feet, and discharge, in second-feet, of Neversink River at Godeffroy, N. Y., for 1911-12—Continued.

Day.	July.				August.				September.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1911.												
1	......	......	......	......	3.1	144	3.1	144	4.6	1,450	4.5	1,300
2	......	......	......	......	3.05	127	3.1	144	4.5	1,300	4.3	1,030
3	......	......	......	......	3.1	144	3.0	110	3.6	392	3.8	532
4	......	......	......	......	3.2	184	2.8	59	3.2	184	3.4	280
5	......	......	......	......	3.1	144	2.7	41	3.3	230	3.5	334
6	......	......	......	......	2.7	41	2.7	41	4.0	700	3.8	532
7	......	......	......	......	2.7	41	3.2	184	3.6	392	3.7	458
8	......	......	......	......	3.1	144	3.1	144	3.5	334	3.6	392
9	......	......	......	......	2.7	41	3.1	144	3.4	280	3.5	334
10	......	......	......	......	2.7	41	2.7	41	3.7	458	3.5	334
11	......	......	......	......	2.7	41	3.1	144	3.55	363	3.7	458
12	......	......	......	......	2.6	27	3.0	110	3.5	334	3.6	392
13	......	......	......	......	2.8	59	2.7	41	3.7	458	3.8	532
14	......	......	......	......	2.7	41	2.6	27	3.8	532	3.7	458
15	......	......	......	......	2.8	59	2.7	41	3.5	334	3.6	392
16	......	......	......	......	2.7	41	2.6	27	3.4	280	3.3	230
17	......	......	......	......	2.8	59	2.7	41	3.3	230	3.4	280
18	......	......	......	......	2.9	82	2.8	59	3.2	184	3.2	184
19	......	......	......	......	2.7	41	2.6	27	3.1	144	3.3	230
20	......	......	......	......	2.7	41	2.8	59	3.2	184	3.2	184
21	2.8	59	1.7	0	2.75	50	2.7	41	3.4	280	3.5	334
22	2.05	0	2.75	50	2.75	50	2.65	34	3.3	230	3.3	230
23	3.1	144	2.8	59	2.6	27	2.7	41	3.2	184	3.25	207
24	3.5	334	3.6	392	2.7	41	2.8	59	3.3	230	3.2	184
25	3.4	280	3.5	334	3.0	110	3.2	184	3.3	230	3.1	144
26	3.4	280	3.2	184	3.2	184	3.25	207	3.2	184	3.3	230
27	3.2	184	3.15	164	3.2	184	3.0	110	3.4	280	3.35	255
28	3.0	110	2.1	0	3.1	144	3.05	12.	3.3	230	3.4	280
29	2.8	59	3.15	164	3.7	458	4.4	1,160	3.3	230	3.3	230
30	2.8	59	2.7	41	4.6	1,450	4.6	1,450	3.2	184	3.35	255
31	3.0	110	3.0	110	4.4	1,160	4.5	1,300	......	......	......	......

Day.	October.				November.				December.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1911.												
1	3.4	280	3.5	334	4.2	910	4.1	800	4.05	750	3.9	610
2	4.9	1,920	4.7	1,600	4.3	1,030	4.2	910	4.0	700	4.1	800
3	4.6	1,450	4.2	910	4.0	700	3.85	571	4.0	700	4.05	750
4	4.1	800	4.0	700	3.8	532	3.7	458	3.95	655	4.0	700
5	3.95	655	3.95	655	3.65	425	3.75	495	3.85	571	3.8	532
6	3.8	532	3.6	392	3.6	392	3.8	532	3.7	458	3.8	532
7	4.05	750	4.3	1,030	3.8	532	3.6	392	3.75	495	3.7	458
8	4.1	800	4.0	700	3.6	392	3.8	532	3.8	532	3.85	571
9	3.95	655	3.8	532	3.7	458	3.65	425	3.75	495	3.7	458
10	3.85	571	3.7	458	3.8	532	3.75	495	3.75	495	3.6	392
11	3.6	392	3.8	532	3.6	392	3.6	392	3.8	532	3.7	458
12	3.7	458	3.7	458	3.8	532	3.7	458	3.75	495	3.65	425
13	3.65	425	3.6	392	4.3	1,030	4.2	910	3.8	532	3.7	458
14	3.7	458	3.8	532	4.1	800	4.0	700	3.75	495	3.6	392
15	3.6	392	3.5	334	4.0	700	3.8	532	3.7	458	3.8	532
16	3.4	280	3.6	392	4.1	800	4.2	910	4.4	1,160	4.6	1,450
17	3.8	532	3.7	458	3.9	610	4.0	700	4.6	1,450	4.5	1,300
18	3.9	610	4.8	1,760	4.2	910	4.2	910	4.05	750	4.2	910
19	5.8	3,440	5.3	2,590	4.5	1,300	4.6	1,450	4.3	1,030	4.15	855
20	4.9	1,920	5.0	2,080	4.5	1,300	4.4	1,160	4.0	700	3.9	610
21	5.2	2,420	5.5	2,930	4.2	910	4.35	1,100	3.8	532	3.6	392
22	5.2	2,420	5.1	2,250	4.2	910	4.2	910	4.05	750	4.15	855
23	5.7	3,270	5.8	3,440	4.1	800	4.3	1,030	4.95	2,000	5.5	2,930
24	4.95	2,000	5.2	2,420	4.2	910	4.1	800	4.95	2,000	4.6	1,450
25	4.65	1,520	4.55	1,380	4.1	800	4.2	910	4.75	1,680	4.65	1,520
26	4.5	1,300	4.7	1,600	4.2	910	4.0	700	4.5	1,300	4.3	1,030
27	4.35	1,100	4.4	1,160	4.3	1,030	4.2	910	4.4	1,160	4.2	910
28	4.2	910	4.3	1,030	3.95	655	4.0	700	4.4	1,160	4.3	1,030
29	4.1	800	4.3	1,030	4.1	800	4.3	1,030	4.4	1,160	4.35	1,100
30	4.1	800	4.3	1,030	4.2	910	4.25	970	4.1	800	3.95	655
31	4.0	700	4.2	910	......	......	......	......	4.0	700	3.85	571

Gage height, in feet, and discharge, in second-feet, of Neversink River at Godeffroy, N. Y., for 1911-12—Continued.

Day.	January.				February.				March.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1912.												
1	3.90	610	3.70	458								
2	3.65	425	3.50	334								
3	3.60	392	3.60	392								
4	3.60	392	3.60	392								
5	3.65	425	3.62	405								
6	3.60	392	3.65	425								
7												
8												
9												
10									4.7	1,600	4.7	1,600
11									4.8	1,760	4.9	1,920
12									4.8	1,760	4.7	1,600
13									5.5	2,080	6.4	
14									4.9	1,920	4.7	1,600
15									4.9	1,920	5.5	2,930
16									6.7		5.8	3,440
17												
18									5.2	2,420	5.2	2,420
19									5.3	2,590	5.4	2,760
20									5.4	2,760	5.2	2,420
21									5.3	2,590	4.8	1,760
22									4.7	1,600	4.6	1,450
23									4.6	1,450	4.5	1,300
24									4.6	1,450	4.7	1,600
25									4.7	1,600	4.5	1,300
26									4.6	1,450	4.4	1,160
27									4.2	910	4.7	1,600
28									4.6	1,450	4.8	1,760
29									5.6	3,100	6.0	3,780
30									5.8	3,440	5.7	3,270
31									5.3	2,590		

Day.	April.				May.				June.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1912.												
1					4.9	1,920	4.8	1,760	3.47	318	3.57	375
2					4.6	1,450	4.4	1,160	3.42	291	3.47	318
3					4.3	1,030	4.25	970	3.57	375	3.62	405
4					4.2	910	4.2	910	3.47	318	3.52	346
5					4.1	800	4.15	855	3.42	291	3.47	318
6					4.0	700	4.3	1,030	3.47	318	3.37	265
7					4.2	910	4.3	1,030	3.52	346	3.47	318
8					4.1	800	4.5	1,300	3.57	375	3.47	318
9					4.4	1,160	4.3	1,030	3.52	346	3.57	375
10					4.3	1,030	4.25	970	3.37	265	3.52	346
11					4.15	855	4.3	1,030	3.32	240	3.42	291
12					4.4	1,160	4.0	700	3.27	216	3.22	193
13					4.2	910	4.15	855	3.27	216	3.27	216
14					3.80	532	3.70	458	3.17	172	3.27	216
15	4.3	1,030	4.2	910	3.70	458	4.0	700	3.12	152	3.17	172
16	5.2	2,420	5.3	2,590	4.0	700	4.5	1,300	3.27	216	3.17	172
17	5.4	2,760	5.3	2,590	5.5	2,930	5.0	2,080	3.17	172	3.17	172
18	5.2	2,420	5.1	2,250	4.8	1,760	4.7	1,600	3.27	216	3.27	216
19	5.2	2,420	5.0	2,080	4.9	1,920	4.5	1,300	3.17	172	3.22	193
20	4.9	1,920	4.75	1,680	4.4	1,160	4.3	1,030	3.0	110	3.27	216
21	4.7	1,600	4.5	1,300	4.3	1,030	4.15	855	3.22	193	3.12	152
22	4.3	1,030	4.2	910	4.05	750	4.0	700	3.27	216	3.17	172
23	4.2	910	4.15	855	4.2	910	3.90	610	3.12	152	2.97	102
24	4.3	1,030	4.3	1,030	3.70	458	3.70	458	3.02	117	3.07	134
25	4.4	1,160	4.2	910	3.60	392	3.80	532	3.17	172	2.97	102
26	4.3	1,030	4.3	1,030	3.70	458	3.70	458	2.77	54	3.07	134
27	4.2	910	4.15	855	3.60	392	3.70	458	2.77	54	2.97	102
28	4.35	1,100	4.2	910	3.60	392	3.65	425	2.87	75	2.77	54
29	4.3	1,030	5.0	2,080	3.70	458	3.90	610	2.77	54	2.67	37
30	5.3	2,590	5.1	2,250	3.60	392	3.50	334	2.67	37	2.77	54
31					3.40	280	3.50	344				

Gage height, in feet, and discharge, in second-feet, of Neversink River at Godeffroy, N. Y., for 1911–12—Continued.

Day.	July.				August.				September.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1912.												
1	3.02	117	3.07	134	2.60	27	3.05	127	4.0	700	4.1	800
2	2.97	102	3.17	172	2.70	41	2.80	59	3.30	230	3.50	334
3	3.07	134	2.77	54	2.70	41	3.00	110	3.70	458	3.80	532
4	2.82	63	2.72	45	2.70	41	3.10	144	3.50	334	3.40	280
5	2.91	102	2.77	54	2.80	59	2.90	82	3.30	230	3.35	255
6	3.07	134	3.17	172	2.70	41	2.80	59	3.20	184	3.20	184
7	3.17	172	2.77	54	2.60	27	2.90	82	3.25	207	3.10	144
8	2.87	75	3.12	152	2.70	41	2.80	59	3.30	230	3.10	144
9	2.77	54	3.17	172	2.80	59	2.80	59	3.30	230	3.10	144
10	2.82	63	3.12	152	2.80	59	3.60	392	3.15	164	3.30	230
11	2.87	75	2.97	102	6.8	....	5.1	2,250	3.10	144	3.20	184
12	2.97	102	3.17	172	4.9	1,920	4.2	910	2.90	82	3.00	110
13	3.12	152	3.07	134	3.90	610	3.70	458	3.00	110	3.10	144
14	2.87	75	2.97	102	3.40	280	3.20	184	3.10	144	3.05	127
15	2.77	54	3.12	152	3.25	207	3.20	184	2.70	41	3.00	110
16	2.82	63	3.17	172	3.30	230	3.35	255	3.05	127	3.10	144
17	2.97	102	3.17	172	3.20	184	3.20	184	3.10	144	3.10	144
18	2.77	54	3.22	193	3.50	334	3.45	307	3.05	127	3.10	144
19	3.12	152	3.17	172	3.30	230	3.40	280	3.00	110	3.10	144
20	2.97	102	3.27	216	3.40	280	3.30	230	3.10	144	3.20	184
21	3.17	172	3.22	193	3.45	307	3.20	184	3.20	184	3.10	144
22	3.12	152	3.17	172	3.35	255	3.30	230	2.80	59	3.05	127
23	2.87	75	3.07	134	3.50	334	3.40	280	3.00	110	2.80	59
24	3.07	134	3.17	172	3.40	280	3.40	280	3.10	144	3.10	144
25	2.77	54	3.07	134	3.30	230	3.35	255	3.50	334	3.60	392
26	2.77	54	2.97	102	3.25	207	3.30	230	3.50	334	3.60	392
27	2.87	75	3.07	134	3.15	164	3.20	184	3.30	230	3.20	184
28	2.67	37	3.17	172	3.20	184	3.25	207	3.10	144	3.15	164
29	2.77	54	2.87	75	3.10	144	3.20	184	3.15	164	3.20	184
30	2.67	37	2.77	54	3.15	164	3.15	164	3.15	164	3.20	184
31	2.77	54	2.9	82	3.10	144	3.20	184	......	......	......	......

Day.	October.				November.				December.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1912.												
1	3.00	110	2.70	41	3.72	473	3.82	548	3.47	318	3.47	318
2	3.10	144	3.00	110	3.82	548	3.72	473	3.50	334	3.57	375
3	3.20	184	2.90	82	3.77	510	3.62	405	5.0	2,080	5.0	2,080
4	3.00	110	2.80	59	3.62	405	3.52	346	4.9	1,920	4.50	1,300
5	2.90	82	2.70	41	3.72	473	3.42	291	4.7	1,600	4.65	1,520
6	3.00	110	2.75	50	3.52	346	3.47	318	4.40	1,160	4.35	1,100
7	2.85	70	2.65	34	3.32	240	3.42	291	4.25	970	4.10	800
8	3.00	110	2.85	70	3.22	193	3.37	265	4.10	800	4.05	750
9	......	......	......	......	3.27	216	3.12	152	3.92	628	3.97	673
10	......	......	......	......	2.82	63	2.82	63	4.00	700	3.82	548
11	......	......	......	......	3.77	510	3.82	548	3.92	628	3.87	587
12	......	......	......	......	3.77	510	3.82	548	3.82	548	3.82	548
13	......	......	......	......	3.72	473	3.67	438	3.52	346	3.57	375
14	......	......	......	......	3.62	405	3.67	438	3.82	548	3.72	473
15	......	......	......	......	3.82	548	3.82	548	3.87	587	3.82	548
16	......	......	......	......	3.77	510	3.82	548	3.77	510	3.52	346
17	......	......	......	......	3.77	510	3.77	510	3.72	473	3.67	438
18	......	......	......	......	3.57	375	3.62	405	3.82	548	3.72	473
19	......	......	......	......	3.42	291	3.47	318	3.92	628	4.00	700
20	......	......	......	......	3.42	291	3.42	291	4.22	934	4.10	800

Gage height, in feet, and discharge, in second-feet, of Neversink River at Godeffroy, N. Y., for 1911–12—Continued.

Day.	October.				November.				December.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1912.												
21	......	......	......	......	3.42	291	3.42	291	3.92	628	4.00	700
22	2.82	63	3.02	117	3.47	318	3.42	291	3.82	640	3.87	587
23	3.02	117	3.12	152	3.42	291	3.42	291	3.92	628	3.87	587
24	3.32	240	3.52	346	3.32	240	3.42	291	3.77	510	3.82	548
25	3.82	548	3.92	628	3.92	628	3.92	628	3.72	473	3.92	628
26	3.62	405	3.82	548	3.92	628	3.92	628	3.82	548	3.87	587
27	3.72	473	3.77	510	3.67	438	3.62	405	3.72	473	3.77	510
28	3.82	548	3.62	405	3.57	375	3.67	438	3.82	548	3.87	587
29	3.87	587	3.92	628	3.52	346	3.47	318	3.92	628	3.77	510
30	3.72	473	3.82	548	3.47	318	3.47	318	4.10	800	4.05	750
31	3.57	375	3.62	405	......	......	......	......	4.02	720	3.92	628

NOTE.—Relation of gage height to discharge affected by ice Jan. 1–7, 1911, and Jan. 7–Mar. 9, 1912. Discharge determined from a fairly well defined rating curve.

LEHIGH RIVER AT SOUTH BETHLEHEM, PA.

Location.—On the New Street Bridge connecting Bethlehem and South Bethlehem, Pa.

Records available.—September 22, 1902, to February 13, 1905; April 26, 1909, to December 31, 1912. Complete data 1902 to 1909 are published in Water Supply Paper 261.

Drainage area.—1,235 square miles.

Gage.—Chain and weight, similar to that employed when the station was first established; datum of the present gage 0.09 foot higher than that of the old one used prior to 1909; elevation of the zero of the present gage 210.64 feet above sea level.

Channel.—Straight for one-third mile above and several hundred feet below the station. A low rubble dam crosses a portion of the channel a few hundred feet below the bridge. The construction of this dam caused an alteration in the rating curve for 1902 and certain changes in the dam caused a further slight change in the rating curve between 1905 and 1909. The river bed consists of sand, gravel, and bowlders, and seems to be fairly permanent. Velocity good at low stages. Left bank low and overflows at high stages; right bank is high and does not overflow.

Discharge measurements.—Made from the bridge.

Winter flow.—Relation between gage height and discharge at this station is little affected by ice.

Canal.—Lehigh Canal follows the left bank and passes over Monocacy Creek and under the left span of the bridge. The creek also passes under the bridge and enters the river a short distance below. An ice plant and gristmill take water from the canal and return it to the river above the bridge. The canal is measured at Main Street Bridge, one-third mile above the station, and the discharge, reduced by the amount of tailrace flow of ice plant and gristmill, is added to the river discharge. At high stages the river overflows into the canal and creek.

Accuracy.—Good.

Cooperation.—Since its reestablishment this station has been maintained by the Water Supply Commission of Pennsylvania, and many of the measurements have been made by students of Lehigh University, under the direction of the civil-engineering department.

Daily gage height, in feet, of Lehigh River at South Bethlehem, Pa., for 1910–1912.

[J. E. Santee, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	1.97	3.13	8.39	2.77	4.74	3.33	2.49	1.80	2.01	1.69	1.59	2.20
2	2.02	3.02	8.00	2.69	4.43	3.21	2.42	1.68	1.90	1.60	1.88	2.21
3	2.34	3.02	7.56	2.74	4.19	3.21	2.40	1.67	1.94	1.73	2.00	2.12
4	2.09	2.99	6.52	2.54	4.09	3.28	2.36	1.71	2.30	1.58	1.90	1.94
5	2.45	2.90	5.89	2.62	3.86	3.07	2.35	1 91	2.25	1.61	2.26	2.05
6	2.14	2.79	5.66	2.67	3.53	3.55	2.31	1.85	1.94	1.54	2.18	2.03
7	2.33	2.51	6.04	2.86	3.42	3.32	2.25	1.73	2.00	1.71	2.24	1.90
8	2.74	2.50	5.98	2.82	3.28	3.07	2.44	1.78	2.04	1.67	2.14	1.86
9	2.50	2 78	5.32	2.70	3.56	2.95	2.39	1.89	1.95	1.61	2.07	1.77
10	2.47	2.79	4.85	2.62	3.60	3.01	2.32	2.02	1.84	1.64	2.08	1.72
11	2.34	2.64	4.54	2.58	3.40	3.21	2.57	2.24	1.75	1.57	1.97	1.71
12	2.25	2.48	4.30	2.54	3.27	3.35	2.38	2.12	1.89	1.55	2.31	1.77
13	2.26	2.44	4.01	2.46	3.14	3.30	2.20	1.94	1.82	1.57	2.19	1.95
14	2.23	2.48	3.78	2.47	3.02	3.07	2.02	1.86	2.37	1.49	2.26	1.85
15	2.09	2.56	3.75	2.42	2.90	2.92	2.07	1.96	2.34	1.33	2.19	1.94
16	1.99	2.65	3.72	2.35	2.86	3.02	2.00	1.89	2.14	1.52	2.08	1.87
17	2.15	2.74	3.62	2.31	2.77	3.59	2.24	1.82	1.89	1.63	2.17	2.06
18	2.23	3.62	3.51	4.70	2.74	3.54	2.27	1.72	1.80	1.62	2.06	1.84
19	2.59	3.28	3.33	5.92	2.75	4.42	2.14	1.69	1.87	1.46	2.05	1.92
20	3.01	3.04	3.28	5.50	2.71	4.08	2.07	1.82	1.79	1.62	1.93	1.96
21	3.03	5.00	3.42	5.03	3.26	3.78	2.02	1.76	1.62	1.58	2.07	1.86
22	12.74	6.68	3.46	4.64	3.19	3.34	1.94	1.75	1.76	1.61	2.02	1.80
23	7.37	5.65	3.34	4.24	3.08	3.20	1.92	1.76	1.63	1.62	2.03	1.77
24	5.63	4.43	3.27	4.12	3.06	3.04	1.83	1.72	1.58	1.92	1.86	2.50
25	4.90	3.89	3.19	7.42	4.95	2.91	1.89	1.73	1.60	1.69	1.96	3.18
26	4.27	3.64	3.14	7.93	5.20	2.52	1.85	1.68	1.77	1.63	1.99	2.71
27	4.05	3.71	3.06	7.00	4.75	2.82	1.75	1.44	1.78	1.64	1.96	2.73
28	3.79	5.89	3.10	5.82	4.26	2.82	1.82	1.56	1.83	1.66	2.03	2.61
29	3.63	....	3.01	5.11	3.94	2.74	1.78	1.73	1.74	1.54	2.09	2.67
30	3.37	....	2.92	5.46	3.68	2.66	1.68	1.60	1.79	1.46	2.13	2.85
31	3.35	....	2.80	....	3.40	....	1.80	1.55	....	1.64	....	3.04
1911.												
1	3.01	2.78	2.97	3.63	3.32	3.45	2.41	2.05	6.76	2.66	3.28	3.40
2	3.52	2.82	2.94	3.51	3.75	3.22	2.34	2.05	5.17	5.75	3.14	3.29
3	5.49	2.50	2.86	3.33	3.21	2.93	2.34	2.04	4.27	4.54	3.01	3.15
4	6.11	2.81	2.74	3.29	3.12	2.74	2.30	2.63	3.82	3.89	2.94	3.27
5	4.74	3.52	2.54	3.92	3.05	2.61	2.33	2.37	3.39	3.59	2.91	3.09
6	4.21	2.75	2.60	4.17	2.90	2.66	2.25	2.30	3.60	3.28	2.86	3.11
7	3.97	2.53	2.54	4.11	2.83	2.87	2.17	2.18	3.66	3.57	3.69	3.07
8	3.68	2.78	2.36	4.01	2.79	2.68	2.42	2.59	3.41	3.24	3.25	3.02
9	3.62	2.70	2.53	3.95	2.72	2.53	2.15	2.33	3.25	3.15	3.06	2.95
10	3.24	2.63	2.69	4.01	2.70	2.43	2.20	2.15	3.55	3.04	3.01	2.85
11	3.16	2.51	3.11	3.88	2.68	2.34	2.21	2.03	3.31	3.10	2.90	2.96
12	3.24	2.42	2.80	3.82	2.64	4.01	2.16	1.98	3.76	3.17	2.76	2.93
13	3.42	2.99	2.97	3.68	2.57	5.78	2.04	1.90	3.34	3.02	3.30	2.89
14	4.07	2.55	2.87	3.74	2.51	6.55	2.05	2.06	3.15	2.86	3.25	2.86
15	4.73	2.61	3.08	4.27	2.52	5.32	2.38	1.93	3.07	2.78	3.17	2.93
16	4.25	2.43	3.41	3.89	2.46	4.58	2.10	1.98	3.08	2.87	3.12	3.40
17	3.64	2.61	2.71	3.86	2.45	4.39	2.94	1.93	2.94	2.77	3.04	4.15
18	3.47	3.01	3.21	3.72	2.46	3.87	3.12	2.03	2.85	4.00	3.75	3.73
19	3.32	3.30	2.97	3.59	2.43	3.42	2.50	1.88	2.75	4.86	4.46	3.55
20	3.30	2.80	3.02	4.65	2.61	3.26	2.30	1.80	2.66	4.36	4.21	3.37
21	3.26	2.53	3.15	4.79	2.42	3.06	2.37	1.91	2.58	4.17	3.92	3.27
22	3.16	2.44	3.04	4.70	2.39	2.94	2.47	1.73	2.70	4.72	3.65	3.39
23	3.03	2.52	3.11	4.67	2.33	3.18	2.32	1.78	2.53	5.45	3.49	3.87
24	2.86	2.48	3.19	4.38	2.32	2.97	2.54	1.78	2.52	5.28	3.60	4.04
25	2.64	2.51	2.97	4.07	2.22	2.93	2.79	2.10	2.44	4.73	3.70	3.90
26	2.82	3.13	3.04	3.84	2.26	2.93	2.50	2.33	2.33	4.28	3.38	3.82
27	2.78	3.23	3.50	3.70	2.31	2.92	2.37	2.27	2.37	4.06	3.38	3.99
28	2.99	3.38	4.82	3.55	2.12	2.78	2.27	2.31	2.28	3.86	3.32	3.83
29	3.26	....	4.38	3.43	2.22	2.69	2.15	3.80	2.47	3.58	3.56	3.41
30	3.15	....	4.21	3.34	2.23	2.57	2.07	5.62	2.99	3.50	3.44	3.39
31	2.94	....	3.92	....	2.40	....	2.16	6.02	....	3.35	....	3.60

Daily gage height, in feet, of Lehigh River at South Bethlehem, Pa., for 1910–1912—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.												
1	3.43	2.26	3.41	5.47	4.28	2.63	1.95	1.68	1.64	2.90	3.08	2.74
2	3.38	2.28	3.17	5.43	4.02	2.52	1.87	1.70	2.04	2.78	3.27	3.15
3	3.20	2.09	2.86	5.77	3.83	2.81	1.83	1.64	2.16	2.64	3.06	4.13
4	3.09	1.98	2.93	5.11	3.63	2.63	1.67	1.60	2.01	2.57	3.01	4.18
5	2.92	2.53	2.85	4.79	3.53	2.52	1.93	1.72	1.88	2.44	2.90	3.92
6	2.86	2.54	2.69	4.53	3.54	2.58	1.97	1.69	1.98	2.30	2.85	3.94
7	3.16	2.34	2.77	4.40	3.83	2.91	1.95	1.59	2.37	2.34	3.02	4.05
8	3.22	2.11	3.19	4.73	4.65	2.61	1.97	1.57	2.40	2.32	4.79	3.80
9	3.14	2.03	3.16	4.31	4.47	2.47	1.75	1.66	2.07	2.22	4.34	3.66
10	3.16	2.20	2.85	4.12	4.23	2.46	1.84	1.70	1.71	2.22	3.90	3.47
11	2.98	2.36	2.86	3.93	4.03	2.35	2.06	2.92	1.70	2.67	3.77	3.40
12	2.88	2.23	3.54	3.80	3.92	2.27	1.97	2.40	1.77	2.55	3.53	3.25
13	2.82	2.06	3.37	3.80	3.81	2.25	1.90	2.24	1.64	2.28	3.39	2.78
14	2.62	2.05	4.94	3.72	3.63	2.22	1.76	2.19	1.68	2.38	3.40	2.91
15	2.72	2.05	9.06	3.69	3.53	2.17	1.97	2.23	1.56	2.27	3.29	2.91
16	2.91	2.07	8.73	3.68	3.74	2.23	1.86	2.17	2.42	2.19	3.12	3.00
17	2.95	2.06	6.26	3.90	4.49	2.34	1.88	1.89	2.22	2.17	2.92	2.93
18	2.71	2.12	5.60	5.09	4.03	2.34	2.04	1.71	2.10	2.12	2.92	2.92
19	2.85	2.42	5.36	5.97	3.78	2.23	1.91	2.10	2.11	2.08	2.87	3.13
20	2.96	2.75	5.21	5.28	3.61	2.12	1.83	2.70	2.22	1.94	2.83	3.60
21	2.89	4.30	4.86	4.65	3.38	2.09	1.74	2.41	2.01	2.07	2.75	3.23
22	2.86	6.95	4.46	4.50	3.18	2.06	2.07	2.23	1.86	2.10	2.72	2.99
23	2.64	3.67	4.44	4.35	3.14	2.02	1.90	2.26	2.03	2.76	2.69	3.01
24	2.57	3.40	4.59	4.05	3.08	2.05	1.84	2.09	2.45	4.55	3.09	2.94
25	2.51	3.41	5.05	3.89	2.99	2.06	1.78	1.95	5.14	5.04	3.56	2.77
26	2.46	3.81	4.71	3.73	2.88	2.06	1.74	2.01	4.99	4.39	3.17	2.91
27	2.38	5.11	4.54	3.65	2.80	2.02	1.63	1.80	4.16	3.99	3.02	2.95
28	2.21	4.09	4.64	3.69	2.69	1.97	1.68	1.82	3.47	3.73	2.92	3.32
29	2.29	3.70	5.38	3.55	2.84	1.95	1.84	1.83	3.19	3.47	2.90	2.95
30	2.38	......	7.03	4.36	2.87	1.87	1.70	1.82	3.14	3.30	2.79	3.12
31	2.32	......	5.85	......	2.85	......	1.53	1.75	......	3.15	......	4.69

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 1–21, 1910. No material ice effect during other years. Gage heights for 1910–11 supersede those published in Water Supply Papers 281 and 301.

Daily discharge, in second-feet, of Lehigh River at South Bethlehem, Pa., for 1910–1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	508	1,820	14,400	1,380	4,880	2,170	1,040	430	584	359	300	750
2	547	1,660	13,200	1,280	4,200	1,980	967	353	500	305	486	760
3	840	1,660	12,000	1,340	3,700	1,980	945	347	530	384	575	678
4	606	1,620	9,210	1,100	3,510	2,090	905	372	845	294	500	530
5	955	1,500	7,600	1,190	3,080	1,780	895	508	798	311	807	618
6	651	1,360	7,030	1,250	2,500	2,530	855	465	530	272	732	600
7	830	1,020	7,980	1,490	2,310	2,150	798	384	575	373	788	500
8	1,300	1,010	7,820	1,440	2,090	1,780	989	417	609	347	696	472
9	1,010	1,340	6,200	1,290	2,550	1,610	935	493	538	311	634	410
10	977	1,360	5,080	1,190	2,620	1,690	865	592	458	329	643	378
11	840	1,170	4,390	1,150	2,280	1,980	1,140	788	398	288	552	372
12	752	988	3,880	1,100	2,070	2,200	925	678	493	278	855	410
13	752	944	3,310	1,010	1,880	2,120	750	530	444	288	741	538
14	734	988	2,890	1,020	1,710	1,780	592	472	915	244	807	465
15	606	1,080	2,880	967	1,540	1,570	634	545	885	160	741	530
16	522	1,180	2,830	895	1,490	1,710	575	493	696	261	643	479
17	660	1,300	2,650	855	1,380	2,600	788	444	493	323	723	626
18	734	2,600	2,460	4,780	1,340	2,510	816	378	430	317	626	458
19	1,110	2,040	2,170	7,720	1,350	4,180	696	359	479	228	618	515
20	1,650	1,690	2,090	6,680	1,300	3,490	634	444	424	317	522	545
21	1,680	5,430	2,310	5,550	2,060	2.930	592	404	317	294	634	472
22	28,400	9,630	2,380	4,650	1,950	2,180	530	398	404	311	592	430
23	11,500	7,000	2,180	3,800	1,790	1,960	515	404	323	317	600	410
24	6,960	4,150	2,070	3,560	1,760	1,740	451	378	294	444	472	1,060
25	5,200	3,090	1,950	11,600	5,360	1,560	493	384	305	359	545	1,940
26	3,820	2,640	1,880	13,100	5,960	1,440	465	353	410	323	568	1,300
27	3,380	2,760	1,760	10,500	4,900	1,440	398	217	417	329	545	1,330
28	2,910	7,600	1,820	7,480	3,840	1,440	444	283	451	341	600	1,180
29	2,620	......	1,690	5,740	3,220	1,340	417	384	391	272	652	1,250
30	2,190	......	1,570	6,580	2,760	1,240	353	305	424	228	687	1,480
31	2,160	......	1,420	......	2,280	......	430	278	......	329	......	1,740

Daily discharge, in second-feet, of Lehigh River at South Bethlehem, Pa., for 1910–1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	1,650	1,340	1,590	2,670	2,150	2,360	956	618	9,880	1,240	2,090	2,280
2	2,430	1,400	1,550	2,460	2,880	2,000	885	618	5,880	7,300	1,880	2,100
3	6,610	1,010	1,450	2,170	1,980	1,590	885	609	3,860	4,430	1,690	1,850
4	8,160	1,380	1,300	2,100	1,850	1,340	845	1,210	3,010	3,130	1,600	2,030
5	4,830	2,430	1,060	3,190	1,750	1,180	875	915	2,260	2,600	1,560	1,760
6	3,700	1,310	1,120	3,660	1,540	1,240	798	845	2,620	2,090	1,490	1,790
7	3,230	1,040	1,060	3,540	1,450	1,500	723	732	2,720	2,560	2,770	1,730
8	2,710	1,340	860	3,350	1,400	1,270	967	1,160	2,300	2,030	2,040	1,660
9	2,600	1,240	1,040	3,240	1,320	1,090	705	875	2,040	1,890	1,760	1,570
10	1,980	1,160	1,230	3,350	1,290	978	750	705	2,530	1,740	1,690	1,440
11	1,860	1,020	1,790	3,110	1,270	885	760	600	2,140	1,820	1,540	1,580
12	1,980	922	1,370	3,010	1,220	3,350	714	560	2,900	1,920	1,360	1,540
13	2,270	1,620	1,590	2,760	1,140	7,380	609	500	2,180	1,710	2,120	1,490
14	3,420	1,440	1,460	2,860	1,070	9,340	617	626	1,890	1,490	2,040	1,450
15	4,810	1,140	1,790	3,860	1,080	6,240	925	522	1,780	1,390	1,920	1,540
16	3,780	933	2,300	3,130	1,010	4,520	660	560	1,790	1,510	1,850	2,240
17	2,640	1,140	1,300	3,080	1,000	4,110	1,600	522	1,600	1,380	1,740	3,580
18	2,350	1,650	1,980	2,830	1,010	3,100	1,850	600	1,480	3,340	2,880	2,800
19	2,110	2,080	1,640	2,600	978	2,310	1,060	486	1,350	5,150	4,260	2,480
20	2,080	1,370	1,710	4,680	1,180	2,060	845	430	1,240	4,050	3,740	2,190
21	2,010	1,040	1,890	4,990	967	1,760	915	508	1,150	3,660	3,190	2,030
22	1,860	944	1,740	4,780	935	1,600	1,020	384	1,290	4,830	2,700	2,220
23	1,680	1,030	1,830	4,720	875	1,940	865	417	1,090	6,560	2,430	3,050
24	1,450	933	1,950	4,090	865	1,640	1,100	417	1,080	6,150	2,620	3,370
25	1,170	1,020	1,640	3,470	769	1,590	1,400	660	989	4,850	2,790	3,100
26	1,400	1,820	1,740	3,040	807	1,590	1,060	875	875	3,880	2,250	2,960
27	1,340	1,970	2,440	2,790	855	1,570	915	816	915	3,450	2,250	3,270
28	1,620	2,200	5,060	2,530	678	1,390	816	855	826	3,080	2,150	2,980
29	2,010	......	4,090	2,330	769	1,280	705	2,970	1,020	2,580	2,550	2,250
30	1,850	......	3,740	2,180	778	1,140	634	6,980	1,670	2,440	2,350	2,220
31	1,550	......	3,190	......	945	......	714	7,980	......	2,200	......	2,570
1912.												
1	2,470	910	2,440	6,800	4,080	1,360	655	430	400	1,720	1,970	1,500
2	2,390	930	2,060	6,700	3,560	1,240	584	445	738	1,550	2,260	2,070
3	2,100	740	1,610	7,560	3,200	1,590	550	400	855	1,370	1,940	3,730
4	1,940	637	1,710	5,900	2,850	1,360	422	370	710	1,290	1,870	3,830
5	1,700	1,200	1,600	5,150	2,680	1,240	637	461	593	1,150	1,720	3,320
6	1,610	1,210	1,390	4,570	2,690	1,300	673	438	682	995	1,640	3,360
7	2,040	994	1,490	4,280	3,200	1,730	655	363	1,070	1,040	1,880	3,570
8	2,130	760	2,080	5,010	4,880	1,340	673	349	1,100	1,020	5,190	3,100
9	2,010	684	2,040	4,090	4,480	1,180	485	415	766	915	4,200	2,850
10	2,040	850	1,600	3,710	3,980	1,170	559	445	453	915	3,320	2,530
11	1,780	1,020	1,610	3,340	3,580	1,050	757	1,740	445	1,410	3,090	2,420
12	1,640	880	2,650	3,100	3,360	965	673	1,100	501	1,270	2,680	2,180
13	1,560	712	14,600	3,100	3,160	945	610	935	400	975	2,450	1,500
14	1,300	702	5,500	2,960	2,850	915	493	885	430	1,080	2,460	1,680
15	1,430	702	16,600	2,900	2,680	865	673	925	342	965	2,290	1,680
16	1,680	722	15,600	2,890	3,040	925	576	865	1,130	885	2,020	1,810
17	1,740	712	8,800	3,280	4,520	1,040	593	602	915	865	1,740	1,710
18	1,410	770	7,130	5,860	3,580	1,040	738	453	795	815	1,740	1,700
19	1,600	1,080	6,530	8,060	3,110	925	619	795	805	776	1,670	2,000
20	1,750	1,460	6,160	6,330	2,810	815	550	1,440	915	646	1,620	2,750
21	1,660	4,070	5,310	4,830	2,430	786	477	1,120	710	766	1,510	2,150
22	1,610	10,600	4,410	4,500	2,120	757	766	925	576	795	1,470	1,800
23	1,330	2,870	4,370	4,180	2,060	719	610	955	728	1,520	1,430	1,820
24	1,250	2,420	4,700	3,570	1,970	748	559	786	1,160	4,660	1,980	1,730
25	1,180	2,440	5,760	3,260	1,840	757	509	655	6,020	5,780	2,730	1,490
26	1,130	3,120	4,960	3,020	1,690	757	477	710	5,660	4,300	2,100	1,680
27	1,040	5,900	4,590	2,880	1,580	719	392	525	3,840	3,500	1,890	1,740
28	860	3,650	4,810	2,950	1,430	973	430	542	2,580	3,020	1,740	2,290
29	940	2,920	6,580	2,710	1,630	655	559	550	2,130	2,580	1,720	1,740
30	1,040	......	10,800	4,240	1,670	584	445	542	2,060	2,300	1,560	1,980
31	972	......	7,760	......	1,640	......	321	485	......	2,070	......	4,920

NOTE.—Daily discharge determined from a well-defined rating curve. No corrections for ice effect. Daily discharge tables for 1910–11 supersede those published in Water-Supply Papers 281 and 301.

Monthly discharge of Lehigh River at South Bethlehem, Pa., for 1912.

[Drainage area, 1,235 square miles.]

Month.	Discharge in second-feet. Maximum.	Minimum.	Mean.	Per square mile.	Run-off (depth in inches on drainage area).
1910.					
January	28,400	508	[a] 2,820	2.28	2.63
February	9,630	944	2,520	2.04	2.12
March	14,400	1,420	4,550	3.68	4.24
April	13,100	855	3,720	3.01	3.36
May	5,960	1,300	2,700	2.19	2.52
June	4,180	1,240	2,040	1.65	1.84
July	1,140	353	704	.570	.66
August	788	217	428	.346	.40
September	915	294	512	.415	.46
October	444	160	308	.249	.29
November	855	300	629	.509	.57
December	1,940	372	749	.606	.70
The year	28,400	160	1,800	1.46	19.79
1911.					
January	8,160	1,170	2,680	2.17	2.50
February	2,430	922	1,350	1.09	1.14
March	5,060	860	1,890	1.53	1.76
April	4,990	2,100	3,220	2.61	2.91
May	2,880	678	1,220	.988	1.14
June	9,340	885	2,440	1.98	2.21
July	1,850	609	909	.736	.85
August	7,980	384	1,180	.955	1.10
September	9,880	826	2,210	1.79	2.00
October	7,300	1,240	3,110	2.52	2.90
November	4,260	1,360	2,240	1.81	2.02
December	3,580	1,440	2,230	1.81	2.09
The year	9,880	384	2,060	1.67	22.62
1912.					
January	2,470	860	1,590	1.29	1.49
February	14,200	637	1,920	1.55	1.67
March	21,900	1,390	5,400	4.37	5.04
April	8,060	2,710	4,390	3.55	3.96
May	4,880	1,430	2,850	2.31	2.66
June	1,730	584	1,000	.810	.90
July	766	321	572	.463	.53
August	1,740	349	698	.565	.65
September	6,020	342	1,320	1.07	1.19
October	5,780	646	1,710	1.38	1.59
November	5,190	1,430	2,200	1.78	1.99
December	4,920	1,500	2,340	1.89	2.18
The year	21,900	321	2,170	1.76	23.85

[a] May be somewhat high because of ice.

TOHICKON CREEK AT POINT PLEASANT, PA.

Location.—About one-eighth mile above the mouth of the creek.

Records available.—1883 to 1912, except 1900.

Drainage area.—102 square miles.

Gage.—Automatic register.

Discharge measurements.—High stage determined from a curve developed from current meter measurements. The lower part of the rating curve has been developed from the computed discharge over a weir.

Accuracy.—Discharge rating curve well defined.

Cooperation.—Records obtained and furnished by the Philadelphia Bureau of Water, Department of Public Works.

Monthly discharge of Tohickon Creek at Point Pleasant, Pa., for 1912.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).
	Mean.	Per square mile.			Mean.	Per square mile.	
January	196	1.92	2.21	August	37.5	.368	0.42
February	372	3.65	3.94	September	122	1.20	1.34
March	706	6.92	7.98	October	210	2.06	2.38
April	173	1.70	1.90	November	250	2.45	2.73
May	118	1.16	1.34	December	310	3.04	3.50
June	11.0	.108	.12				
July	6.2	.061	.07	The year	209	2.05	27.93

NESHAMINY CREEK BELOW THE FORKS, PA.

Location.—A short distance below the junction of Big and Little Neshaminy creeks.

Records available.—1884 to 1912.

Drainage area.—139 square miles.

Gage.—Automatic register.

Discharge measurements.—Discharge at high stages determined from a curve developed from current meter measurements; lower part of rating curve developed from the computed discharge over a weir.

Accuracy.—Discharge rating curve well defined.

Cooperation.—Records obtained and furnished by Philadelphia Bureau of Water, Department of Public Works.

Monthly discharge of Neshaminy Creek below the forks, Pa., for 1912.

[Drainage area, 139 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).
	Mean.	Per square mile.			Mean.	Per square mile.	
January	220	1.58	1.82	August	89.4	0.643	0.74
February	477	3.43	3.70	September	117	.842	.94
March	759	5.46	6.30	October	294	2.12	2.44
April	248	1.78	1.99	November	253	1.82	2.03
May	130	.935	1.08	December	348	2.50	2.88
June	26.5	.191	.21				
July	19.9	.143	.16	The year	248	1.78	24.29

SCHUYLKILL RIVER NEAR PHILADELPHIA, PA.

Location.—At Fairmount Dam, near Philadelphia.

Records available.—1898 to 1912.

Drainage area.—1,920 square miles.

Discharge measurements.—Computed daily discharge represents the total flow of the river as determined from the amount wasted over the flashboards at Fairmount Dam, the pumpage from the river, the leakage, and the quantity used for power at Fairmount.

Diversions.—Except for a small amount of water drawn from the Delaware, the entire water supply for the city of Philadelphia is taken from the Schuylkill.

Cooperation.—Records obtained and furnished by the Philadelphia Bureau of Water, Department of Public Works.

Monthly discharge of Schuylkill River near Philadelphia, Pa., for 1912.

[Drainage area, 1,920 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).
	Mean.	Per square mile.			Mean.	Per square mile.	
January	1,880	0.979	1.13	August	1,250	0.651	0.75
February	3,510	1.83	1.97	September	1,470	.766	.85
March	7,810	4.07	4.69	October	1,500	.781	.90
April	3,620	1.89	2.11	November	1,930	1.01	1.13
May	2,370	1.23	1.42	December	2,570	1.34	1.54
June	641	.334	.37				
July	615	.320	.37	The year	2,430	1.27	17.23

PERKIOMEN CREEK NEAR FREDERICK, PA.

Location.—About 12 miles above the mouth of the creek and above the East Branch.

Records available.—1884 to 1912.

Drainage area.—152 square miles.

Gage.—Automatic register.

Discharge measurements.—Discharge at high stages determined from a curve developed from current-meter measurements; lower part of rating curve developed from the computed discharge over a weir.

Accuracy.—Discharge rating curve well defined.

Cooperation.—Records obtained and furnished by Philadelphia Bureau of Water, Department of Public Works.

Monthly discharge of Perkiomen Creek near Frederick, Pa., for 1912.

[Drainage area, 152 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).
	Mean.	Per square mile.			Mean.	Per square mile.	
January	266	1.75	2.02	August	117	0.770	0.89
February	494	3.25	3.50	September	270	1.78	1.99
March	877	5.77	6.65	October	191	1.26	1.45
April	246	1.62	1.81	November	246	1.62	1.81
May	256	1.68	1.94	December	362	2.38	2.74
June	70.1	.461	.51				
July	58.8	.387	.45	The year	288	1.89	25.75

SUSQUEHANNA RIVER BASIN.

SUSQUEHANNA RIVER AT CONKLIN, N. Y.

Location.—At highway bridge three-tenths mile below Conklin P. O., on Lackawanna Railroad, 8 miles above the junction with the Chenango at Binghamton and 5 miles below mouth of Big Snake Creek, coming in from left.

Records available.—November 13 to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff gage in two sections. The upper section is vertical and bolted to upstream side of left abutment of bridge. The lower section is an inclined gage located 15 feet upstream.

Channel.—Bed of stream consists of cobble and bowlders embedded in coarse gravel and sand. Measuring section is divided into three parts at all stages by the two piers of the bridge.

Discharge measurements.—Made from upstream side of highway bridge; low-water measurements made by wading below the bridge.

Accuracy.—Discharge rating curve well defined. Conditions good for making measurements.

Discharge measurements of Susquehanna River at Conklin, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 25	Frank Weber	2.10	361
Nov. 14	....do	5.57	4,570

Daily gage height, in feet, and discharge, in second-feet, of Susquehanna River at Conklin, N. Y., for 1912.

[Daniel Ames, observer.]

Day.	November.		December.		Day.	November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
1			4.3	2,390	16	5.3	4,040	4.4	2,540
2			5.1	3,680	17	5.0	3,500	4.4	2,540
3			8.5	11,500	18	4.8	3,160	4.3	2,390
4			8.1	10,500	19	4.7	3,000	5.0	3,500
5			7.0	7,800	20	4.6	2,840	6.4	6,400
6			7.0	7,800	21	4.4	2,540	5.7	4,840
7			7.2	8,280	22	4.4	2,540	5.0	3,500
8			6.6	6,860	23	4.2	2,240	4.7	3,000
9			5.9	5,280	24	4.2	2,240	4.8	3,160
10			5.3	4,040	25	4.4	2,540	4.6	2,840
11			5.0	3,500	26	4.7	3,000	4.5	2,690
12			5.0	3,500	27	4.8	3,160	4.4	2,540
13	5.5	4,430	4.6	2,840	28	4.7	3,000	4.4	2,540
14	5.5	4,430	4.3	2,390	29	4.6	2,840	4.2	2,240
15	5.4	4,230	4.4	2,540	30	4.4	2,540	4.4	2,540
					31			5.2	3,860

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Susquehanna River at Conklin, N. Y., for 1912.

[Drainage area, 2,350 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
November 13-30	4,430	2,240	3,130	1.33	0.89	A.
December	11,500	2,240	4,320	1.84	2.12	A.

SUSQUEHANNA RIVER AT BINGHAMTON, N. Y.

Location.—At the Washington Street Bridge in Binghamton, about 800 feet above the mouth of Chenango River. No important tributaries between the station and the mouth of Unadilla Creek, about 50 miles upstream.

Records available.—July 31, 1901, to December 31, 1912. Data also in annual reports of State engineer and surveyor, State of New York.

Drainage area.—2,400 square miles.

Gage.—Standard chain fastened to upstream side of bridge, read twice daily; datum unchanged.

Channel.—Bed composed of rocks and gravel. Current swift but somewhat irregular. Channel at times clogged with grass and bars.

Discharge measurements.—Usually made at the Exchange Street Bridge, 1,900 feet above the Washington Street Bridge.

Artificial control.—2,800 feet upstream from the bridge is a timber crib dam affording 6 feet head; used for power development. There is no material control of the water by this dam.

Winter flow.—As a rule not greatly affected by ice.

Accuracy.—Discharge rating curve for low and medium stages is not well developed. The measurements plot erratically due to changes in conditions of flow. High-stage gage heights liable to considerable error because of backwater from ice jams which form near Willow Bend and also by backwater from Chenango River. Published data not very satisfactory.

Cooperation.—Gage heights for 1912 furnished by the United States Weather Bureau.

Discharge measurements of Susquehanna River at Binghamton, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 17 [a]	G. C. Covert	10.68	24,100	Apr. 6 [a]	Frank Weber	8.70	13,700
19 [a]	Alexander McMillan	9.68	16,300	7 [a]	.....do	10.40	18,000
20 [a]	.....do	10.67	19,500	July 24 [b]	.....do	1.87	355

[a] Measure made at Exchange Street Bridge.

[b] Measure made by wading.

Daily gage height, in feet, of Susquehanna River at Binghamton, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	2.5	4.7	11.7	5.0	2.8	2.0	1.9	2.1	3.5	3.2	3.0
2	3.4	2.5	4.1	13.3	4.3	2.7	2.0	1.9	3.5	3.4	3.2	3.0
3	3.2	3.0	3.8	13.2	3.8	2.7	2.0	1.9	3.1	3.1	3.2	7.6
4	3.1	2.5	3.6	9.0	3.3	2.9	2.0	1.8	2.6	2.9	3.1	7.6
5	2.9	3.2	3.1	7.4	3.2	2.8	2.0	1.9	2.5	2.8	2.9	6.0
6	2.8	2.9	3.1	8.8	3.2	2.7	2.0	1.9	2.5	2.7	2.8	5.6
7	2.9	2.4	2.6	10.2	3.2	2.7	2.0	1.9	2.4	2.6	2.8	6.4
8	3.4	2.6	2.7	12.0	3.4	2.6	2.0	1.9	2.3	2.5	6.8	5.6
9	3.3	3.0	3.5	10.9	3.5	2.5	2.0	1.9	2.3	2.5	7.1	4.7
10	3.7	3.0	4.0	8.7	3.4	2.4	2.0	1.8	2.2	2.5	5.9	4.1
11	4.2	2.4	3.8	7.4	3.3	2.4	2.0	2.1	2.2	2.4	4.9	3.7
12	3.8	2.7	3.1	7.1	3.1	2.4	2.0	2.0	2.2	2.5	4.4	3.5
13	3.4	2.5	3.5	7.0	3.3	2.3	2.0	2.2	2.2	2.6	4.0	3.2
14	3.4	2.4	4.2	6.9	3.1	2.3	1.9	2.1	2.1	2.6	3.9	2.7
15	3.2	2.5	5.0	6.2	2.9	2.3	2.0	2.1	2.1	2.7	4.0	2.9
16	3.4	2.4	8.2	8.3	2.9	2.2	1.9	2.0	2.3	2.6	3.8	3.1
17	3.1	2.2	11.3	7.7	3.9	2.2	2.0	2.0	2.2	2.5	3.6	3.0
18	2.8	2.2	10.0	7.2	4.3	2.2	2.0	1.9	2.5	2.5	3.4	2.9
19	2.8	2.3	9.8	7.4	4.0	2.2	1.9	2.0	2.5	2.5	3.3	3.1
20	3.4	2.4	10.7	7.1	3.5	2.2	1.9	2.0	2.5	2.4	3.2	4.7

Daily gage height, in feet, of Susquehanna River at Binghamton, N. Y., for 1912—**Contd.**

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	3.0	2.8	9.1	6.0	3.2	2.2	1.9	2.0	2.6	2.5	3.1	4.4
22	3.3	4.0	7.0	5.2	3.1	2.2	1.9	2.1	2.6	2.4	3.1	3.7
23	3.1	5.1	5.5	5.4	3.0	2.2	1.9	2.4	2.5	2.4	3.0	3.4
24	2.9	4.8	5.1	5.7	3.1	2.1	1.9	2.5	2.8	2.6	3.0	3.2
25	3.2	4.6	4.6	5.2	2.9	2.1	1.9	2.4	5.1	6.8	3.1	3.1
26	2.8	4.9	4.0	4.7	2.8	2.1	1.9	2.8	5.3	6.1	3.3	2.9
27	2.6	5.1	3.7	4.2	2.7	2.1	1.9	2.5	4.7	4.9	3.4	3.0
28	2.6	5.7	3.9	4.0	2.6	2.0	1.9	2.3	4.1	4.3	3.3	2.9
29	2.5	5.7	7.4	3.8	2.6	2.1	1.9	2.2	3.4	3.8	3.2	2.8
30	2.5	....	13.0	5.2	2.9	2.0	1.9	2.1	3.6	3.6	3.1	3.0
31	2.5	....	11.8	....	3.3	....	1.9	2.1	....	3.4	....	3.6

NOTE.—Gage heights Mar. 18–21 and Apr. 1–9 affected by backwater from Chenango River and are means of several readings.

Daily discharge, in second-feet, of Susquehanna River at Binghamton, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,290	1,440	6,930	28,800	7,760	2,100	540	410	690	3,790	3,050	2,570
2	3,540	1,440	5,320	34,500	5,850	1,870	540	410	3,790	3,540	3,050	2,570
3	3,050	2,570	4,540	34,100	4,540	1,870	540	410	2,810	2,810	3,050	15,400
4	2,810	1,440	4,040	19,800	3,290	2,330	540	300	1,650	2,330	2,810	15,400
5	2,330	3,050	2,810	10,600	3,050	2,100	540	410	1,440	2,100	2,330	10,600
6	2,100	2,330	2,810	13,700	3,050	1,870	540	410	1,440	1,870	2,100	9,440
7	2,330	1,240	1,650	18,000	3,050	1,870	540	410	1,240	1,650	2,100	11,800
8	3,540	1,650	1,870	22,400	3,540	1,650	540	410	1,050	1,440	13,000	9,440
9	3,290	2,570	3,790	21,400	3,790	1,440	540	410	1,050	1,440	13,900	6,930
10	4,290	2,570	5,060	18,800	3,540	1,240	540	300	860	1,440	10,300	5,320
11	5,580	1,240	4,540	14,800	3,290	1,240	540	690	860	1,240	7,480	4,290
12	4,540	1,870	2,810	13,900	2,810	1,240	540	540	860	1,440	6,120	3,790
13	3,540	1,440	3,790	13,600	3,290	1,050	540	860	860	1,650	5,060	3,050
14	3,540	1,240	5,580	13,200	2,810	1,050	410	690	690	1,650	4,800	1,870
15	3,050	1,440	7,760	11,200	2,330	1,050	540	690	690	1,870	5,060	2,330
16	3,540	1,240	17,300	17,600	2,330	860	410	540	1,050	1,650	4.540	2,810
17	2,810	860	27,400	15,700	4,800	860	540	540	860	1,440	4,040	2,570
18	2,100	860	19,800	14,200	5,850	860	540	410	1,440	1,440	3,540	2,330
19	2,100	1,050	16,300	14,800	5,060	860	410	540	1,440	1,440	3,290	2,810
20	3,540	1,240	18,000	13,900	3,790	860	410	540	1,440	1,240	3,050	6,930
21	2,570	2,100	17,300	10,600	3,050	860	410	540	1,650	1,440	2.810	6,120
22	3,290	5,060	13,900	8,320	2,810	860	410	690	1,650	1,240	2,810	4,290
23	2,810	8,040	9,160	8,880	2,570	860	410	1,240	1,440	1,240	2,570	3,540
24	2,330	7,200	8,040	9,720	2,810	690	410	1,440	2,100	1,650	2,570	3,050
25	3,050	6,660	6,660	8,320	2,330	690	410	1,240	8,040	13,000	2,810	2,810
26	2,100	7,480	5,060	6,930	2,100	690	410	2,100	8,600	10,900	3,290	2,330
27	1,650	8,040	4,290	5,580	1,870	690	410	1,440	6,930	7,480	3,540	2,570
28	1,650	9,720	4,800	5,060	1,650	540	410	1,050	5,320	5,850	3,290	2,330
29	1,440	9,720	14,800	4,540	1,650	690	410	860	3,540	4,540	3,050	2,100
30	1,440	....	33,400	8,320	2,330	540	410	690	4,040	4,040	2,810	2,570
31	1,440	....	29,200	....	3,290	....	410	690	....	3,540	....	4,040

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge Mar. 18–21 and Apr. 1–9 estimated from discharge measurements and computed effect of backwater from Chenango River.

Monthly discharge of Susquehanna River at Binghamton, N. Y., for 1912.

[Drainage area, 2,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	5,580	1,440	2,860	1.19	1.37	B.
February	9,720	860	3,340	1.39	1.50	B.
March	33,400	1,650	9,960	4.15	4.78	C.
April	34,500	4,540	14,700	6.12	6.83	C.
May	7,760	1,650	3,360	1.40	1.61	B.
June	2,330	540	1,180	.492	.55	C.
July	540	410	477	.199	.23	C.
August	2,100	300	706	.294	.34	C.
September	8,600	690	2,320	.967	1.08	B.
October	13,000	1,240	2,980	1.24	1.43	B.
November	13,900	2,100	4,410	1.84	2.05	B.
December	15,400	1,870	5,100	2.12	2.44	B.
The year	34,500	300	4,270	1.78	24.21	

SUSQUEHANNA RIVER AT WILKES-BARRE, PA.

Location.—At the Market Street Bridge, Wilkes-Barre.

Records available.—1888 to December 31, 1912.

Drainage area.—9,810 square miles.

Gage.—The Weather Bureau gage, on which readings were begun in 1888, was on the left pier of the bridge. A chain gage established by the United States Geological Survey in 1899 was fastened to the bridge and its datum was made 4 feet lower than the datum of the Weather Bureau gage to avoid negative readings. This datum was soon after adopted by the Weather Bureau. Since April 1, 1905, when the Survey discontinued reading the gage, the gage heights have been furnished by the Weather Bureau. On July 20, 1910, the Weather Bureau installed a Mott type gage in the same position and at the same datum as the chain gage. The datum adopted by the United States Geological Survey gage has remained constant. Records obtained by the Weather Bureau prior to the adoption of the Geological Survey gage datum should have 4 feet added to reduce them to the present datum.

Channel.—The station is situated in a deep pool with steep high banks which seldom overflow.

Discharge measurements.—Made from the bridge.

Winter flow.—Relation between gage height and discharge at this station affected by ice during the winter. Water is often backed up many feet by ice gorges.

Accuracy.—Conditions of flow subject to change at irregular intervals. A fairly good discharge rating curve has been developed.

Cooperation.—Complete data for this station were furnished by the Water Supply Commission of Pennsylvania, but their computations were revised slightly by the Geological Survey.

The following measurement was made by Boehringer and Reckord:

May 21, 1912: Gage height, 7.39 feet; discharge, 18,000 second-feet.

Daily gage height, in feet, of Susquehanna River at Wilkes-Barre, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.74	3.44	7.24	17.94	13.74	5.34	2.54	2.13	3.13	7.53	5.63	5.43
2	5.44	3.74	6.64	18.74	11.04	5.14	2.54	2.13	3.43	7.03	5.43	5.33
3	5.54	3.84	5.74	22.24	9.14	4.74	2.44	2.23	10.03	6.63	5.23	8.53
4	5.14	3.54	5.24	20.54	7.94	4.44	2.44	2.23	7.83	6.23	5.13	11.83
5	5.04	3.54	4.94	16.14	7.14	5.14	2.54	2.23	6.33	5.73	5.03	11.73
6	7.94	3.44	5.54	13.54	6.64	4.84	2.54	2.23	6.63	5.23	4.83	10.33
7	6.34	3.34	6.64	15.24	6.34	4.44	2.44	2.23	6.53	5.03	4.73	10.43
8	5.94	3.44	5.24	16.34	6.44	4.24	2.44	2.23	5.13	4.63	7.73	10.73
9	5.54	3.24	5.24	17.44	7.34	4.04	2.44	2.23	4.63	4.43	11.23	9.53
10	5.34	3.34	5.34	15.54	7.94	3.94	2.44	2.23	4.03	4.23	11.13	8.33
11	5.74	3.04	6.44	13.24	7.44	3.74	2.44	2.33	3.73	4.13	9.63	7.33
12	5.34	2.94	5.94	11.44	6.84	3.54	2.44	2.90	3.63	4.03	8.43	6.63
13	5.64	2.74	7.74	10.84	6.54	3.34	2.34	2.83	3.83	4.53	7.63	6.03
14	5.64	2.84	6.74	11.54	7.24	3.34	2.34	2.83	3.63	4.53	7.03	5.93
15	5.44	2.74	6.74	10.54	7.14	3.24	2.54	2.90	3.43	4.43	6.73	5.33
16	5.14	2.74	14.64	10.94	6.44	3.14	2.54	2.83	3.43	4.33	6.63	5.13
17	4.94	2.74	16.74	12.94	7.14	3.14	2.54	2.73	3.33	4.23	6.33	5.23
18	4.84	2.64	15.64	12.74	11.44	3.04	2.44	2.73	3.93	4.03	6.03	5.13
19	5.14	2.74	17.64	12.74	9.44	3.04	2.44	2.73	4.03	3.93	5.73	5.23
20	5.04	2.84	15.84	12.04	8.44	2.94	2.54	2.73	4.43	3.73	5.53	6.43
21	4.84	3.34	16.44	11.04	7.34	2.84	2.54	2.73	4.33	3.73	5.33	7.53
22	4.54	4.54	13.94	9.44	6.54	2.94	2.54	2.63	4.23	3.63	5.23	7.23
23	4.74	5.94	10.94	8.94	6.04	2.84	2.44	2.63	4.13	3.83	5.23	6.43
24	4.94	5.94	9.74	8.74	5.84	2.84	2.34	2.83	4.43	4.23	5.23	5.83
25	4.84	6.44	9.04	9.24	5.44	2.74	2.24	3.33	14.93	5.83	5.23	5.43
26	4.44	7.24	8.14	8.64	5.14	2.74	2.24	3.53	14.33	8.73	5.43	5.03
27	4.24	7.84	7.74	8.14	4.94	2.74	2.24	3.23	11.03	9.13	5.63	5.23
28	4.24	9.44	7.74	7.34	4.64	2.64	2.24	4.03	9.63	8.23	5.83	5.03
29	3.94	8.24	11.34	6.94	4.34	2.64	2.24	3.53	8.33	7.13	5.83	4.93
30	3.64	....	20.04	10.04	4.24	2.54	2.24	3.33	7.53	6.43	5.63	4.83
31	3.54	....	21.74	....	4.14	....	2.14	3.13	....	5.93	....	5.63

NOTE.—Relation of gage height to discharge affected by ice Jan. 6 to Feb. 25.

Daily discharge, in second-feet, of Susquehanna River at Wilkes-Barre, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,200	....	16,200	80,000	50,600	8,790	1,420	893	2,450	17,500	9,830	9,110
2	9,140	....	13,700	86,400	34,800	8,090	1,420	893	3,110	15,300	9,110	8,760
3	9,500	....	10,200	118,000	25,000	6,730	1,280	1,010	29,500	13,700	8,400	22,100
4	8,090	....	8,440	102,000	19,300	5,780	1,280	1,010	18,800	12,100	8,060	39,200
5	7,740	....	7,400	66,500	15,800	8,090	1,420	1,010	12,500	10,200	7,700	38,700
6	....	....	9,500	49,300	13,700	7,060	1,420	1,010	13,700	8,400	7,030	31,100
7	....	....	13,700	60,300	12,500	5,780	1,280	1,010	13,300	7,700	6,700	31,600
8	....	....	8,440	67,900	12,900	5,190	1,280	1,010	8,060	6,380	18,400	33,200
9	....	....	8,440	76,200	16,700	4,630	1,280	1,010	6,380	5,750	35,900	27,000
10	....	....	8,790	62,300	19,300	4,360	1,280	1,010	4,600	5,160	35,300	21,100
11	....	....	12,900	47,500	17,100	3,840	1,280	1,130	3,820	4,870	27,500	16,600
12	....	....	11,000	37,000	14,500	3,360	1,280	2,000	3,570	4,600	21,600	13,700
13	....	....	18,400	33,700	13,300	2,910	1,140	1,870	4,070	6,060	17,900	11,300
14	....	....	14,100	37,600	16,200	2,910	1,140	1,870	3,570	6,060	15,300	10,900
15	....	....	14,100	32,200	15,800	2,690	1,420	2,000	3,110	5,750	14,100	8,760
16	....	....	56,400	34,300	12,900	2,470	1,420	1,870	3,110	5,450	13,700	8,060
17	....	....	70,900	45,700	15,800	2,470	1,420	1,710	2,890	5,160	12,500	8,400
18	....	....	63,000	44,500	37,000	2,270	1,280	1,710	4,330	4,600	11,300	8,060
19	....	....	77,700	44,500	26,500	2,270	1,280	1,710	4,600	4,330	10,200	8,400
20	....	....	64,400	40,400	21,600	2,080	1,420	1,710	5,750	3,820	9,470	12,900
21	....	....	68,700	34,800	16,700	1,890	1,420	1,710	5,450	3,820	8,760	17,500
22	....	....	51,900	26,500	13,300	2,080	1,420	1,560	5,160	3,570	8,400	16,200
23	....	....	34,300	24,100	11,400	1,890	1,280	1,560	4,870	4,070	8,400	12,900
24	....	....	28,000	23,100	10,600	1,890	1,140	1,870	5,750	5,160	8,400	10,600
25	....	....	24,500	25,500	9,140	1,720	1,020	2,890	58,200	10,600	8,400	9,110
26	....	16,200	20,200	22,600	8,090	1,720	1,020	3,340	54,400	23,000	9,110	7,700
27	....	18,900	18,400	20,200	7,400	1,720	1,020	2,670	34,800	25,000	9,830	8,400
28	....	26,500	18,400	16,700	6,410	1,570	1,020	4,600	27,500	20,700	10,600	7,700
29	....	20,700	36,500	14,900	5,480	1,570	1,020	3,340	21,100	15,700	10,600	7,360
30	....	....	97,400	29,600	5,190	1,420	1,020	2,890	17,500	12,900	9,830	7,030
31	....	....	113,000	....	4,900	....	904	2,450	....	10,900	....	9,830

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Susquehanna River at Wilkes-Barre, Pa., for 1912.

[Drainage area, 9,810 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	10,200	....	6,800	0.693	0.80	C.
February	26,500	....	8,100	.826	.89	C.
March	113,000	7,400	32,900	3.35	3.86	A.
April	118,000	14,900	46,800	4.77	5.32	A.
May	50,600	4,900	16,400	1.67	1.92	A.
June	8,790	1,420	3,640	.371	.41	A.
July	1,420	904	1,250	.127	.15	A.
August	4,600	893	1,820	.186	.21	A.
September	58,200	2,450	12,900	1.31	1.46	A.
October	25,000	3,570	9,300	.948	1.09	A.
November	35,900	6,700	13,100	1.34	1.50	A.
December	39,200	7,030	15,600	1.59	1.83	A.
The year	118,000	893	14,000	1.43	19.44	

NOTE.—Discharge Jan. 6–Feb. 25 estimated, on account of ice, from climatologic records, and the flow at adjacent stations. Mean discharge Jan. 6–31 estimated 6,400 second-feet; mean discharge Feb. 1–25 estimated 6,000 second-feet. Monthly discharge changed slightly to conform with survey computation rules.

SUSQUEHANNA RIVER AT DANVILLE, PA.

Location.—At the Mill Street Bridge in Danville, 52 miles below Wilkes-Barre, and 1 miles above the mouth of the West Branch of the Susquehanna. No important tributaries enter the Susquehanna within several miles of the station.

Records available.—March 25, 1899, to December 31, 1912.

Drainage area.—11,100 square miles.

Gage.—Chain attached to the bridge March 24, 1905. On March 9, 1904, the bridge to which the gage was attached was carried away by an ice freshet and from that date until the spring of 1905, when the new steel bridge was completed, observations were made from temporary gages and were constantly liable to error for stages less than 5 feet. Except during this period, the datum of the chain gage has remained constant.

Channel.—Practically permanent.

Discharge measurements.—Made from the bridge.

Winter flow.—Considerably affected by ice.

Accuracy.—An excellent discharge rating curve has been developed.

Cooperation.—Complete data for 1912 furnished by Water Supply Commission of Pennsylvania.

The following discharge measurement was made by Boehringer and Reckord:

May 20, 1912: Gage height, 7.55 feet; discharge, 25,600 second-feet.

Daily gage height, in feet, of Susquehanna River at Danville, Pa., for 1912.

[Edward F. Bell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.02	3.88	6.45	15.39	10.91	3.86	2.39	2.09	2.88	6.44	4.92	4.79
2	4.75	3.80	5.98	15.12	10.07	4.62	2.39	2.09	2.83	6.22	4.82	4.77
3	4.68	3.78	5.70	17.52	8.34	4.35	2.35	2.10	5.23	5.78	4.72	6.32
4	4.58	3.75	4.70	17.29	7.19	4.10	2.29	2.12	7.80	5.48	4.49	9.02
5	4.10	3.70	4.18	13.81	6.54	3.96	2.44	2.10	5.86	5.10	4.39	10.47
6	4.25	3.66	4.00	11.37	5.99	4.31	2.47	2.10	5.03	4.78	4.39	9.57
7	5.60	3.50	3.78	11.09	5.79	4.10	2.41	2.09	5.68	4.43	5.12	9.47
8	4.80	3.60	4.12	12.59	5.91	3.88	2.31	2.10	5.18	4.23	5.97	9.37
9	4.70	3.56	4.55	13.69	6.51	3.70	2.29	2.09	4.50	3.93	8.42	8.57
10	4.90	3.51	5.70	12.87	7.09	3.52	2.35	2.17	3.79	3.86	10.12	7.49

Daily gage height, in feet, of Susquehanna River at Danville, Pa., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	5.20	3.50	5.48	11.17	6.84	3.42	2.39	2.51	3.48	3.88	9.12	6.57
12	5.12	3.42	5.30	9.87	6.39	3.25	2.34	2.57	3.30	3.78	7.59	5.97
13	4.08	3.42	6.65	9.07	6.44	3.12	2.34	2.79	3.22	3.68	6.75	5.62
14	5.10	3.48	7.10	8.99	6.59	3.06	2.30	2.80	3.26	3.98	6.25	5.25
15	5.18	3.50	7.70	8.97	6.71	3.00	2.47	2.76	3.18	3.88	5.92	5.07
16	5.20	3.49	12.04	8.94	6.24	2.96	2.43	2.83	3.18	3.76	5.71	4.87
17	5.28	3.61	13.59	10.64	6.59	2.96	2.39	2.71	3.08	3.74	5.57	4.51
18	5.28	3.58	12.79	10.94	8.35	2.90	2.37	2.69	3.26	3.66	5.32	4.72
19	5.45	3.60	14.39	10.74	8.99	2.87	2.33	3.10	4.08	3.54	5.04	5.22
20	5.85	3.90	13.14	10.48	7.67	2.82	2.29	3.34	3.93	3.46	4.82	5.72
21	5.50	4.30	13.49	9.24	6.79	2.80	2.29	3.14	4.09	3.37	4.65	5.75
22	5.08	6.10	11.59	8.79	6.00	2.72	2.31	2.94	4.03	3.33	4.28	5.47
23	4.95	6.25	9.67	7.99	5.48	2.68	2.29	2.61	4.46	3.34	4.41	5.87
24	4.95	6.75	8.29	7.54	5.20	2.66	2.27	2.63	3.93	3.68	4.50	5.42
25	4.80	7.25	7.91	7.84	4.95	2.63	2.22	2.74	9.18	4.78	4.59	4.89
26	4.70	8.10	7.39	7.54	4.74	2.58	2.19	2.95	12.56	5.66	4.71	4.77
27	4.62	11.65	6.79	6.84	4.45	2.54	2.17	3.17	10.28	8.08	4.82	4.71
28	4.50	9.95	7.04	6.19	4.22	2.50	2.15	3.09	8.70	7.30	4.89	4.68
29	4.40	7.42	8.84	6.14	3.94	2.49	2.10	3.37	7.88	6.40	4.99	4.49
30	4.25	....	15.12	7.27	3.85	2.44	2.09	3.17	6.76	5.73	4.92	4.52
31	4.10	....	17.52	....	3.72	....	2.14	2.99	....	5.28	....	4.97

NOTE.—Relation of gage height to discharge affected by ice Jan. 6–Feb. 26.

Daily discharge, in second-feet, of Susquehanna River at Danville, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12,900	....	20,500	101,000	54,000	7,480	2,280	1,600	3,720	20,400	12,400	11,800
2	11,600	....	17,900	97,800	46,500	11,000	2,280	1,600	3,560	19,200	11,900	11,700
3	11,200	....	16,400	129,000	32,500	9,690	2,180	1,620	14,000	16,800	11,400	19,800
4	10,800	....	11,300	126,000	24,900	8,550	2,040	1,660	28,800	15,200	10,300	37,700
5	8,550	....	8,910	83,000	21,000	7,920	2,400	1,620	17,200	13,300	9,870	50,000
6	....	....	8,100	58,200	17,900	9,510	2,480	1,620	13,000	11,700	9,870	42,200
7	....	....	7,140	55,600	16,900	8,550	2,330	1,600	16,000	10,100	13,400	41,400
8	....	....	8,640	70,200	17,500	7,570	2,080	1,620	13,700	9,140	17,800	40,500
9	....	....	10,600	81,800	20,800	6,800	2,040	1,600	10,400	7,790	33,000	34,200
10	....	....	16,400	73,100	24,200	6,080	2,180	1,770	7,180	7,480	46,900	26,800
11	....	....	15,200	56,400	22,700	5,680	2,280	2,590	5,920	7,570	38,500	21,200
12	....	....	14,300	44,800	20,100	5,030	2,160	2,760	5,220	7,140	27,400	17,800
13	....	....	21,600	38,100	20,400	4,550	2,160	3,430	4,920	6,720	22,200	16,000
14	....	....	24,300	37,400	21,300	4,340	2,060	3,460	5,070	8,010	19,400	14,100
15	....	....	28,100	37,300	22,000	4,120	2,480	3,330	4,770	7,570	17,600	13,200
16	....	....	64,700	37,000	19,300	3,980	2,380	3,560	4,770	7,050	16,400	12,200
17	....	....	80,700	51,600	21,300	3,980	2,280	3,170	4,410	6,970	15,700	10,400
18	....	....	72,200	54,300	32,500	3,780	2,230	3,110	5,070	6,640	14,400	11,400
19	....	....	89,400	52,400	37,400	3,680	2,130	4,480	8,460	6,160	13,000	14,400
20	....	....	75,900	50,100	27,900	3,520	2,040	5,370	7,790	5,840	11,900	16,500
21	....	....	79,600	39,400	22,500	3,460	2,040	4,620	8,500	5,490	11,100	16,700
22	....	....	60,300	35,800	18,000	3,200	2,080	3,920	8,240	5,330	9,370	15,200
23	....	....	43,000	30,000	15,200	3,080	2,040	2,870	10,200	5,370	9,970	17,300
24	....	....	32,100	27,100	13,800	3,020	1,990	2,930	7,790	6,720	10,400	14,900
25	....	....	29,500	29,000	12,600	2,930	1,880	3,270	39,000	11,700	10,800	12,300
26	....	....	26,100	27,100	11,500	2,780	1,810	3,950	69,900	16,200	11,400	11,700
27	....	60,900	22,500	22,700	10,200	2,670	1,770	4,730	48,400	30,600	11,900	11,400
28	....	45,500	23,900	19,000	9,090	2,560	1,720	4,440	35,100	25,600	12,800	11,200
29	....	26,300	36,200	18,800	7,840	2,530	1,620	5,490	29,300	20,200	12,800	10,300
30	....	....	97,800	25,400	7,440	2,400	1,600	4,730	22,300	16,500	12,400	10,500
31	....	....	129,000	....	6,880	....	1,700	4,090	....	14,200	....	12,700

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Susquehanna River at Danville, Pa., for 1912.

[Drainage area, 11,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January			7,800	0.703	0.81
February	60,900		10,800	.973	1.05
March	129,000	7,140	38,500	3.47	4.00
April	129,000	18,800	53,600	4.83	5.39
May	54,000	6,880	21,200	1.91	2.20
June	11,000	2,400	5,150	.464	.52
July	2,480	1,600	2,090	.188	.22
August	5,490	1,600	3,120	.281	.32
September	69,900	3,560	15,400	1.39	1.55
October	30,600	5,330	11,600	1.05	1.21
November	46,900	9,370	16,200	1.46	1.63
December	50,000	10,300	19,600	1.77	2.04
The year	129,000	1,600	17,100	1.54	20.94

NOTE.—Discharge Jan. 6 to Feb. 26 estimated by comparison with other stations in the Susquehanna River basin. Mean discharge Jan. 6–31 estimated 7,180 second feet. Mean discharge Feb. 1-26 estimated 6,920 second-feet. Monthly discharge changed slightly to conform with survey computation rules.

SUSQUEHANNA RIVER AT HARRISBURG, PA.

Location.—At the Walnut Street Bridge at Harrisburg, 2 miles below the mouth of Conodoguinet Creek and 1½ miles above the mouth of Paxton Creek.

Records available.—1890 to December 31, 1912.

Drainage area.—24,000 square mile.

Gage.—The original gage established in 1890 by E. Mather, president of the Harrisburg water board, is located in the pump well at the pump house of the city waterworks, the well being connected with the river by two large mains. On July 18, 1904, a chain gage was installed on the Walnut Street Bridge. The data of both gages have remained constant since their establishment.[1]

Channel.—Fairly permanent. The river is divided into two channels by Foster Island which is overflowed at flood stages.

Discharge measurements.—Made from the bridge. No measurement has been made since 1908.

Winter flow.—Relation between gage height and discharge affected by ice.

Accuracy.—Conditions of flow relatively permanent; a good discharge rating curve has been developed.

Cooperation.—Complete data for 1912 furnished by the Water Supply Commission of Pennsylvania.

Daily gage height, in feet, of Susquehanna River at Harrisburg, Pa., for 1912.

[R. H. Hosmer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.40	3.05	6.00	12.53	6.71	2.56	1.13	1.32	1.65	4.47	3.35	2.72
2	4.08	2.99	4.98	11.46	8.44	2.48	1.11	1.25	1.65	4.22	3.11	2.65
3	4.05	2.88	4.50	12.68	7.30	2.87	1.08	1.11	1.88	3.97	3.04	2.73
4	3.69	2.80	4.00	14.13	6.27	2.69	1.05	1.07	2.37	3.65	2.92	4.00
5	3.54	2.66	3.46	11.55	5.59	2.47	1.07	1.00	4.67	3.40	2.76	5.49
6	3.00	2.55	3.08	9.31	4.96	2.36	1.02	.98	4.72	3.16	2.64	5.77
7	2.88	2.52	3.00	8.09	4.64	2.48	1.16	.93	3.95	2.83	2.62	5.66
8	2.54	2.53	2.83	8.44	5.11	2.36	1.06	.88	3.71	2.63	4.30	5.87
9	3.82	2.47	3.16	9.02	5.69	2.19	1.01	.93	3.09	2.44	6.07	6.05
10	3.46	2.44	3.63	8.87	5.88	2.00	1.00	1.11	2.61	2.33	6.35	5.43

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[1] For full information regarding the two gages and changes in conditions of flow, see U. S. Geol. Survey Water-Supply Papers 109 and 167.

Daily gage height, in feet, of Susquehanna River at Harrisburg, Pa., for 1912—**Continued.**

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	3.53	2.42	3.97	7.79	5.85	1.88	1.01	1.43	2.29	2.26	6.25	4.78
12	3.70	2.37	3.92	6.81	5.50	1.81	.99	2.42	2.06	2.31	5.45	4.20
13	4.09	2.37	4.19	6.12	5.97	1.73	1.15	2.10	1.86	2.33	4.84	3.64
14	4.10	2.30	5.05	5.85	6.65	1.64	.99	1.88	1.71	2.50	4.42	3.21
15	4.17	2.29	5.67	5.96	5.99	1.60	.98	1.86	1.69	2.55	4.12	3.44
16	4.00	2.30	10.20	5.89	5.49	1.58	1.03	1.73	1.74	2.35	3.87	3.04
17	4.11	2.30	11.77	6.37	5.75	1.74	1.15	1.56	1.77	2.31	3.66	2.92
18	4.03	2.30	10.34	7.63	8.19	2.32	1.40	1.50	1.69	2.14	3.46	2.92
19	3.97	2.34	10.01	8.26	8.49	2.36	1.52	1.36	1.72	2.11	3.28	2.94
20	4.06	2.47	10.30	7.95	7.01	2.03	1.46	1.38	2.42	2.04	3.12	3.20
21	4.03	2.76	10.38	7.33	6.02	2.04	1.73	1.77	2.29	1.98	2.98	3.41
22	4.12	4.66	10.07	6.48	5.20	1.84	2.15	1.93	2.18	1.94	2.87	3.46
23	4.08	5.66	9.03	5.76	4.68	1.63	2.50	1.76	2.10	2.04	2.77	3.65
24	4.08	5.26	7.97	5.57	4.23	1.51	2.50	1.73	2.21	2.04	2.69	3.38
25	4.13	5.36	7.20	5.17	3.91	1.57	1.96	1.74	4.74	2.35	2.70	3.09
26	4.13	5.66	7.05	5.18	3.68	1.43	2.04	1.65	8.96	3.59	2.89	2.82
27	3.92	8.50	6.76	4.95	3.35	1.36	2.21	1.60	7.86	3.93	2.82	2.74
28	3.72	9.56	6.76	4.77	3.10	1.32	1.88	1.63	6.41	5.08	2.81	2.70
29	3.48	7.43	7.68	4.54	2.97	1.25	1.63	1.54	5.64	4.57	2.80	2.66
30	3.30	....	11.41	4.88	2.83	1.23	1.52	1.53	4.97	4.07	2.81	2.72
31	3.23	....	13.85	....	2.68	....	1.37	1.71	....	3.67	....	2.97

NOTE.—Relation of gage height to discharge affected by ice Jan. 9 to Feb. 26.

Daily discharge, in second-feet, of Susquehanna River at Harrisburg, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	42,600	....	68,600	204,000	81,200	18,700	7,210	8,360	10,800	43,600	27,500	20,200
2	37,800	....	51,500	178,000	114,000	17,900	7,090	7,930	10,800	39,800	24,300	19,500
3	37,300	....	44,100	208,000	92,300	21,700	6,920	7,090	12,700	36,200	23,500	20,300
4	32,200	....	36,600	246,000	73,300	19,900	6,760	6,870	16,900	31,600	22,200	36,600
5	30,100	....	29,000	181,000	61,500	17,800	6,870	6,480	46,700	28,200	20,600	59,800
6	23,000	....	23,900	132,000	51,200	16,800	6,590	6,370	47,500	24,900	19,400	64,600
7	21,800	....	23,000	108,000	46,300	17,900	7,390	6,090	35,900	21,300	19,200	62,700
8	18,500	....	21,300	114,000	53,600	16,800	6,810	5,830	32,400	19,300	41,000	66,300
9	....	....	24,900	126,000	63,200	15,300	6,530	6,090	24,000	17,500	69,800	69,500
10	....	....	31,300	123,000	66,500	13,700	6,480	7,090	19,100	16,600	74,800	58,800
11	....	....	36,200	102,000	66,000	12,700	6,530	9,110	16,200	15,900	73,000	48,400
12	....	....	35,500	83,000	60,000	12,100	6,420	17,400	14,200	16,400	59,200	39,500
13	....	....	39,400	70,700	68,100	11,400	7,330	14,600	12,500	16,600	49,400	31,500
14	....	....	52,600	66,000	80,100	10,700	6,420	12,700	11,300	18,100	42,900	25,600
15	....	....	62,900	67,900	68,400	10,400	6,370	12,500	11,100	18,600	38,300	28,700
16	....	....	150,000	66,700	59,800	10,200	6,640	11,400	11,500	16,700	34,800	23,500
17	....	....	186,000	75,100	64,300	11,500	7,330	10,100	11,800	16,400	31,700	22,200
18	....	....	153,000	98,600	110,000	16,500	8,900	9,610	11,100	14,900	29,000	22,200
19	....	....	146,000	111,000	115,000	16,800	9,760	8,630	11,300	14,600	26,500	22,400
20	....	....	152,000	105,000	86,800	13,900	9,330	8,770	17,400	14,000	24,400	25,400
21	....	....	154,000	92,900	69,000	14,000	11,400	11,800	16,200	13,500	22,800	28,300
22	....	....	147,000	77,000	56,500	12,300	15,000	13,100	15,200	13,200	21,700	29,000
23	....	....	126,000	64,400	46,900	10,600	18,100	11,700	14,600	14,000	20,700	31,600
24	....	....	105,000	61,200	40,000	9,690	18,100	11,400	15,500	14,000	19,900	27,900
25	....	....	90,400	54,500	35,300	10,100	13,300	11,500	47,800	16,700	20,000	24,000
26	....	....	87,600	54,700	32,000	9,110	14,000	10,800	125,000	30,800	21,900	21,200
27	....	116,000	82,100	51,000	27,500	8,630	15,500	10,400	103,000	35,600	21,200	20,400
28	....	137,000	82,100	48,300	24,200	8,360	12,700	10,600	75,800	53,100	21,100	20,000
29	....	94,800	99,600	44,700	22,700	7,930	10,600	9,920	62,400	45,200	21,000	19,600
30	....	....	177,000	50,000	21,300	7,810	9,760	9,840	51,300	37,600	21,100	20,200
31	....	....	238,000	....	19,800	....	8,700	11,300	....	31,900	....	22,700

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Susquehanna River at Harrisburg, Pa., for 1912.

[Drainage area, 24,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			20,800	0.867	1.00	C.
February	137,000		25,600	1.07	1.15	C.
March	238,000	21,300	88,900	3.70	4.27	A.
April	246,000	44,700	102,000	4.25	4.74	A.
May	115,000	19,800	60,500	2.52	2.90	A.
June	21,700	7,810	13,400	.558	.62	B.
July	18,100	6,370	9,380	.391	.45	B.
August	17,400	5,830	9,850	.410	.47	B.
September	125,000	10,800	30,400	1.27	1.42	A.
October	53,100	13,200	24,100	1.00	1.15	A.
November	74,800	19,200	32,100	1.34	1.50	A.
December	69,500	19,500	33,300	1.39	1.60	A.
The year	246,000	5,830	37,500	1.56	21.27	

NOTE.—Discharge Jan. 9 to Feb. 26 estimated by comparison with the flow at other stations in the Susquehanna River basin. Mean discharge Jan. 9–31 estimated 17,500 second-feet. Mean discharge Feb. 1–26 estimated 15,200 second-feet. Monthly discharge changed slightly to conform with survey publication rules.

CHENANGO RIVER NEAR CHENANGO FORKS, N. Y.

Location.—Two miles by road below Chenango Forks post office, 1.5 miles below the mouth of Tioughnioga River (coming in from the right) above the mouth of river at Binghamton.

Records available.—November 11 to December 31, 1912.

Drainage area.—1,420 square miles.

Gage.—Inclined staff gage on the left bank.

Channel.—One channel at all stages; bed of stream small cobble filled in with sand and gravel, not liable to shift; current uniform across the entire section.

Discharge measurements.—Low-water measurements made by wading near the gage.

Winter flow.—Gage heights somewhat affected by ice during ordinary winters.

Accuracy.—Conditions good for meter measurements. Small diurnal fluctuation in gage height at low water.

Daily gage height, in feet, and discharge, in second-feet, of Chenango River near Chenango Forks, N. Y., for 1912.

[Erastus Ingraham, Observer.]

Day.	November.		December.		Day.	November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
1			4.0	1,780	16	4.3	2,270	3.5	1,080
2			4.1	1,940	17	4.25	2,180	3.5	1,080
3			7.2	9,100	18	4.0	1,780	3.4	960
4			7.3	9,400	19	4.0	1,780	4.3	2,270
5			6.3	6,570	20	4.0	1,780	5.0	3,550
6			7.0	8,500	21	4.0	1,780	5.2	3,960
7			7.0	8,500	22	4.0	1,780	4.9	3,350
8			6.0	5,800	23	4.0	1,780	4.15	2,020
9			5.0	3,550	24	3.5	1,080	4.0	1,780
10			4.45	2,520	25	3.75	1,400	4.05	1,860
11	5.2	3,960	4.25	2,180	26	4.0	1,780	3.95	1,700
12	4.05	1,860	4.1	1,940	27	4.0	1,780	4.0	1,780
13	4.1	1,940	4.0	1,780	28	4.0	1,780	3.85	1,540
14	4.25	2,180	3.4	960	29	4.0	1,780	3.85	1,540
15	4.15	2,020	4.0	1,780	30	4.0	1,780	3.95	1,700
					31			4.8	3,160

NOTE.—Daily discharge determined from a well-defined rating curve based on measurements made during 1913 and 1914.

Monthly discharge of Chenango River near Chenango Forks, N. Y., for 1912.

[Drainage area, 1,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage (area.	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
November 11–30	3,960	1,080	1,920	1.35	1.00	B.
December	8,500	960	3,210	2.26	2.61	B.

CHENANGO RIVER AT BINGHAMTON, N. Y.

Location.—At the Court Street Bridge, Binghamton, N. Y., 300 feet below Noyes dam, about 2,500 feet above the junction with the Susquehanna, and 14 miles below the mouth of Tioughnioga River, coming in from the right.

Records available.—July 31, 1901, to December 31, 1911, and five discharge measurements during 1912. Data also in annual reports of New York State engineer and surveyor.

Drainage area.—1,530 square miles.

Gage.—Standard chain, fastened to the upstream side of the bridge; datum unchanged.

Channel.—Bed of river composed of cobble and gravel; fairly permanent. Very little vegetation at the bridge except at the sides.

Discharge measurements.—Made from the bridge.

Winter flow.—As a rule not greatly affected by the presence of ice, although at times ice jams form on the control point below the gage.

Diversion.—In estimating the run-off of the Chenango River basin the area directly tributary to the storage reservoirs from which water is diverted to supply the Erie Canal is deducted from the total natural drainage area. The diversion area of six reservoirs at the head of Chenango River, whose outflow is turned into the river canal through Limestone Creek, is 30 square miles. The diversion area of De Ruyter Reservoir at the head of Tioughnioga River, whose outflow is turned into Limestone Creek, is 18 square miles. These two drainage areas have been subtracted from the natural drainage area of 1,580 square miles, giving an effective area of 1,532 square miles. This estimate is approximate, as no allowance has been made for direct inflow to the feeder channels from additional areas nor for waste into the original stream. The gross area, from which more or less run-off is diverted, is about 105 square miles.

Accuracy.—Relation between gage height and discharge at times affected by backwater from Susquehanna River (at high stage) and ice jams on control point. At ordinary stages a slight riffle a short distance downstream from the bridge cuts off backwater from the Susquehanna.

Discharge measurements of Chenango River at Binghamton, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 21[a]	C. S. De Golyer	6.21	1,350
Mar. 17[b]	C. C. Covert	15.28	11,600
20	.....do	14.46	15,800
Apr. 5	Frank Weber	11.04	8,350
6	.....do	12.67	13,200

[a] Open-water measurements with some ice at control.

[b] Pronounced backwater effect from high water in Susquehanna.

CHEMUNG RIVER AT CHEMUNG, N. Y

Location.—About midway between Chemung, N. Y., and Willawana, Pa., about half a mile upstream from the State line, and about 10 miles above the junction with the Susquehanna.

Records available.—September 7, 1903, to December 31, 1912. Data also in annual reports of New York State engineer and surveyor.

Drainage area.—2,440 square miles.

Gage.—Tape and weight, read twice daily; located at different points, as follows: September 7, 1903, to April 19, 1911, on the suspension bridge; April 20, 1911, to February 18, 1912, temporarily located about 250 feet upstream from the bridge while the bridge was being replaced; February 19 to December 31, 1912, gage on the new two-span steel truss bridge, on the site of the old bridge; datum same for all locations of the gage.

Channel.—Right bank high, clear, and not subject to overflow; left bank of medium height, wooded, and overflowed at times of high water. Bed of river composed of sand and gravel; clear and fairly permanent.

Discharge measurements.—Made from the bridge.

Winter flow.—Affected by backwater caused by needle ice.

Artificial control.—Largest water-power development on the river is at Elmira, N. Y. No dams on the river between Elmira and the mouth of the Chemung.

Accuracy.—Conditions for accurate determinations of discharge during the open period only fair. Determination of discharge during the winter months liable to be considerably in error as a result of backwater caused by needle ice.

Discharge measurements of Chemung River at Chemung, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*			*Feet.*	*Sec.-feet.*
Feb. 19[a]	C. S. De Golyer	3.08	262	Apr. 3	Frank Weber	9.84	18,100
Mar. 16	C. C. Covert	12.03	25,600	4	.....do	8.12	12,300
18	.....do	10.51	18,000	July 20[b]	.....do	2.07	282
25	G. H. Canfield	4.35	2,480				

[a] Measurement under complete ice cover. [b] Measurement by wading 500 feet below gage.

NOTE.—All measurements, except that of Feb. 19, referred to gage on new bridge.

Daily gage height, in feet, of Chemung River at Chemung, N. Y., for 1912.

[D. L. Orcutt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.23	....	4.2	11.1	7.8	3.75	2.09	1.93	2.23	4.5	3.00	3.30
2	3.23	....	3.75	11.5	6.4	3.35	2.02	1.91	4.5	4.6	3.05	3.35
3	3.11	....	3.45	11.1	5.4	4.0	2.00	1.96	5.1	4.2	2.95	6.3
4	3.01	....	3.35	8.0	4.8	4.3	1.96	1.93	4.4	3.85	2.85	5.9
5	....	....	3.25	7.4	4.4	3.60	2.10	2.05	3.65	3.60	2.85	5.1
6	....	....	3.00	10.2	4.3	3.30	2.08	2.03	3.60	3.40	2.75	5.6
7	....	....	3.00	9.0	4.6	3.10	2.02	1.97	3.45	3.25	2.75	6.3
8	....	....	3.10	9.8	4.7	3.00	2.03	1.95	3.15	3.10	5.9	5.2
9	....	....	4.6	7.6	5.4	2.90	2.00	2.03	2.90	2.95	5.8	4.6
10	....	....	5.0	6.7	5.1	2.75	1.92	2.03	2.75	2.95	5.1	4.1
11	....	....	4.2	6.1	4.7	2.60	2.20	1.95	2.65	3.45	4.6	4.1
12	....	....	3.9	5.6	4.2	2.60	2.40	2.03	2.70	3.75	4.3	3.75
13	....	....	3.7	6.8	4.5	2.55	2.48	2.11	2.60	3.40	4.0	3.35
14	....	....	3.4	6.3	4.7	2.50	2.40	2.19	2.45	3.15	4.0	3.15
15	....	....	3.9	6.0	4.2	2.49	2.25	2.09	2.35	3.00	3.95	3.30

Daily gage height, in feet, of Chemung River at Chemung, N. Y., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	....	....	12.7	6.7	4.1	2.41	2.22	2.09	3.10	2.80	3.75	3.50
17	....	....	9.4	6.3	9.5	2.45	2.28	1.97	3.45	2.75	3.55	3.35
18	....	....	10.2	5.7	7.1	2.41	2.24	1.99	3.20	2.70	3.45	3.25
19	....	....	9.4	5.6	5.8	2.35	2.25	2.04	3.05	2.65	3.35	3.55
20	....	....	9.7	5.1	5.1	2.33	2.12	2.05	3.00	2.65	3.25	3.90
21	....	....	7.2	4.7	4.7	2.28	2.10	2.11	2.90	2.37	3.25	3.55
22	....	....	5.8	4.5	4.4	2.25	2.12	2.15	2.65	2.55	3.15	3.35
23	....	....	5.2	4.7	4.4	2.19	2.05	2.33	2.80	2.55	3.05	3.05
24	....	....	4.9	4.9	4.0	2.27	1.95	2.24	5.1	2.75	3.05	3.05
25	....	....	4.4	4.6	3.70	2.19	1.95	2.21	8.4	4.2	3.25	3.15
26	....	....	4.0	4.4	3.50	2.15	1.95	2.22	6.5	4.6	3.45	3.00
27	....	6.7	3.95	4.1	3.30	2.11	1.93	2.31	5.6	4.1	3.50	3.00
28	....	6.2	5.0	4.0	3.20	2.10	2.00	2.77	5.0	3.70	3.50	2.85
29	....	4.6	11.8	4.0	3.15	2.07	1.98	2.65	4.5	3.45	3.40	2.70
30	....	....	14.9	9.1	4.0	2.05	1.93	2.25	5.2	3.31	3.30	2.90
31	....	....	10.0	....	4.4	....	1.93	2.29	....	3.15	....	3.30

NOTE.—Relation of gage height to discharge affected by ice Jan. 5 to Feb. 26, 1912. There may have been some backwater from ice jams during March, 1912. On Apr. 20, 1911, the gage was removed from the old bridge and installed on the bank of the river about 250 feet above the bridge. On Feb. 19, 1912, it was placed on the new bridge at about the same location it had on the old bridge. All gage heights corrected so as to be comparable with those taken with the gage in its original position.

Daily discharge, in second-feet, of Chemung River at Chemung, N. Y., for 1911-12.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	2,000	1,500	....	3,170	1,440	315	192	90	690	860	655	1,160
2	4,000	1,560	....	2,470	2,800	325	176	108	520	1,620	815	1,010
3	11,400	1,220	....	2,020	2,980	388	180	78	412	2,800	815	910
4	5,550	960	....	1,829	2,020	330	192	78	335	1,680	690	815
5	2,800	1,010	....	2,630	1,620	355	176	73	285	1,320	620	655
6	2,020	860	....	9,600	1,380	365	130	90	275	1,320	599	730
7	1,950	730	....	13,500	1,220	2,020	136	73	365	1,380	620	655
8	2,160	....	....	11,100	960	1,110	126	93	641	3,560	730	655
9	1,500	....	....	7,050	960	815	122	96	532	2,020	1,110	730
10	1,220	....	....	7,840	860	620	122	78	1,110	1,500	960	860
11	1,110	....	4,620	6,050	815	490	126	84	1,560	1,440	815	1,620
12	1,500	....	6,800	4,840	770	478	116	73	1,010	2,020	770	1,500
13	5,300	....	1,270	3,960	690	2,800	102	66	770	1,750	815	2,020
14	3,760	....	7,050	3,360	620	2,980	102	52	730	1,380	1,060	7,300
15	14,200	....	7,050	4,400	585	1,620	96	96	585	1,110	910	4,400
16	6,550	....	5,300	3,760	550	1,160	87	73	520	960	815	5,550
17	3,170	....	2,630	3,170	550	860	99	84	655	860	770	6,050
18	2,310	....	2,800	2,630	550	690	133	84	520	960	770	4,620
19	1,950	....	2,160	2,470	550	550	136	119	460	1,620	1,380	3,360
20	1,750	....	1,820	4,620	1,110	490	200	90	388	1,500	1,620	2,310
21	1,500	....	1,880	7,300	1,160	412	208	96	335	1,220	1,270	1,820
22	1,380	....	2,470	5,500	770	376	160	75	315	1,060	1,110	1,750
23	1,270	....	5,550	6,050	620	315	122	78	275	1,110	1,010	1,820
24	960	....	4,180	5,060	550	305	122	71	250	1,220	910	2,470
25	860	....	2,310	3,760	585	275	112	96	260	1,060	960	1,880
26	860	....	2,310	2,800	550	315	102	108	275	910	1,060	1,620
27	815	....	4,180	2,310	472	255	102	84	235	770	960	1,680
28	4,180	....	13,800	2,020	400	255	102	108	235	730	910	2,310
29	6,300	....	7,840	1,680	550	220	96	960	315	690	1,060	1,270
30	8,960	....	5,060	1,500	310	216	90	2,470	815	655	1,820	1,110
31	2,470	....	4,180	....	330	....	78	1,110	....	627	....	1,160
1912.												
1	1,090	....	2,310	23,800	11,100	1,680	265	192	335	2,800	860	1,160
2	1,090	....	1,680	25,500	7,050	1,220	280	184	2,800	2,980	910	1,220
3	970	....	1,320	23,800	4,620	2,020	220	204	3,960	2,310	815	6,800
4	870	....	1,220	11,800	3,360	2,470	204	192	2,630	1,820	730	5,800
5	....	....	1,110	9,900	2,630	1,500	270	245	1,560	1,500	730	3,960
6	....	....	860	20,000	2,470	1,160	260	235	1,500	1,270	655	5,060
7	....	....	860	15,200	2,980	960	230	208	1,320	1,110	655	6,800
8	....	....	960	18,400	3,170	860	235	200	1,010	960	5,800	4,180
9	....	....	2,980	10,200	4,620	770	220	235	770	815	5,550	2,980
10	....	....	3,760	7,840	3,960	655	188	235	655	815	3,960	2,160

Daily discharge, in second-feet, of Chemung River at Chemung, N. Y., for 1911–12—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11			2,310	6,300	3,170	550	320	200	585	1,320	2,980	2,160
12			1,880	5,060	2,310	550	430	235	620	1,680	2,470	1,680
13			1,620	8,120	2,800	520	478	275	550	1,270	2,020	1,220
14			1,270	6,800	3,170	490	430	315	460	1,010	2,020	1,010
15			1,880	6,050	2,310	484	345	265	400	860	1,950	1,160
16			31,500	7,840	2,160	436	330	265	270	690	1,680	1,380
17			16,800	6,800	17,200	460	360	208	1,320	655	1,440	1,220
18			20,000	5,300	9,000	436	340	216	1,060	620	1,320	1,110
19			16,800	5,060	5,550	400	345	240	910	585	1,220	1,440
20			18,000	3,960	3,960	388	280	245	860	585	1,110	1,880
21			9,300	3,170	3,170	360	270	275	770	412	1,110	1,440
22			5,550	2,800	2,630	345	280	295	585	520	1,010	1,220
23			4,180	3,170	2,630	315	245	388	690	520	910	910
24			3,560	3,560	2,020	355	200	340	3,960	655	910	910
25			2,630	2,980	1,620	315	200	325	13,200	2,310	1,110	1,010
26			2,020	2,630	1,380	295	200	330	7,300	2,980	1,320	860
27		7,840	1,950	2,160	1,160	275	192	376	5,060	2,160	1,380	860
28		6,550	3,760	2,020	1,060	270	220	669	3,760	1,620	1,380	730
29		2,980	27,000	2,020	1,010	255	212	585	2,800	1,320	1,270	620
30			44,500	15,600	2,020	245	192	345	4,180	1,170	1,160	770
31			19,200		2,630		192	365		1,010		1,160

NOTE.—Daily discharge determined from a well-defined rating curve. Daily discharge for 1911 appears to be generally low, for reasons which have not yet been determined. It may be that construction work on the new bridge had some temporary effect on the relation of gage height to discharge.

Monthly discharge of Chemung River at Chemung, N. Y., for 1911–12.

[Drainage area, 2,440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
January	14,200	815	3,250	1.33	1.53	C.
February			1,390	.570	.59	D.
March	13,800		3,450	1.41	1.63	D.
April	13,500	1,500	4,610	1.89	2.11	C.
May	2,980	310	946	.388	.45	C.
June	2,980	216	724	.297	.33	C.
July	208	78	130	.053	.06	C.
August	2,470	52	224	.092	.11	C.
September	1,560	235	506	.207	.23	C.
October	3,560	627	1,350	.553	.64	C.
November	1,820	599	947	.388	.43	C.
December	7,300	655	2,120	.869	1.00	C.
The year	14,200	52	1,640	.672	9.11	
1912.						
January			700	.287	.33	D.
February			1,500	.615	.66	D.
March	44,500	860	8,150	3.34	3.85	C.
April	25,500	2,020	8,930	3.66	4.08	A.
May	17,200	1,010	3,830	1.57	1.81	A.
June	2,470	245	701	.287	.32	A.
July	478	188	272	.111	.13	A.
August	669	184	287	.118	.14	A.
September	13,200	270	2,200	.902	1.01	A.
October	2,980	412	1,300	.533	.61	A.
November	5,800	655	1,680	.689	.77	A.
December	6,800	620	2,090	.857	.99	A.
The year	44,500	184	2,640	1.08	14.70	

NOTE.—Discharge Feb. 8 to Mar. 10, 1911, and Jan. 5 to Feb. 26, 1912, estimated from climatologic records and comparison with the flow at adjacent stations. Mean discharge Feb. 8 to 28, 1911, estimated 1,480 second-feet. Mean discharge Mar. 1 to 10, 1911, estimated 1,170 second-feet. Mean discharge Jan. 4 to 31, 1912, estimated 660 second feet. Mean discharge Feb. 1 to 26, 1912, estimated 1,000 second feet. Discharge for 1911 appears to be low throughout the year. No definite reason can be assigned for this.

WEST BRANCH OF SUSQUEHANNA RIVER AT WILLIAMSPORT, PA.

Location.—At the Market Street Bridge in Williamsport, 2 miles below the mouth of Lycoming Creek and about 2 miles above the mouth of Loyalsock Creek.

Records available.—March 1, 1895, to December 31, 1912.

Drainage area.—5,640 square miles.

Gage.—Standard chain, fastened to the bridge August 16, 1901; datum unchanged.

Channel.—Permanent.

Discharge measurements.—Made from the bridge or by wading. No measurement has been made since 1908.

Artificial control.—There is a dam about one-half mile above the station, but the operation of this dam probably has no effect on the daily gage height.

Winter flow.—Affected by ice.

Accuracy.—Conditions of flow at this point are constant, and a good discharge rating curve has been developed.

Cooperation.—Complete data for 1912 furnished by the Water Supply Commission of Pennsylvania.

Daily gage height, in feet, of West Branch of Susquehanna River at Williamsport, Pa., for 1912.

[H. L. Guise, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.2	3.7	7.9	14.3	8.95	3.1	0.1	0.6	1.0	5.3	4.35	2.65
2	5.0	3.6	7.6	11.9	7.8	3.0	.1	.4	1.6	5.0	2.7	2.6
3	4.9	3.4	6.9	17.4	6.95	2.9	.1	.4	1.9	4.8	2.55	2.45
4	4.6	3.4	5.5	14.7	5.9	2.7	.1	.3	4.8	3.0	2.2	3.4
5	4.4	3.3	5.1	10.1	5.45	2.3	.1	.3	7.0	2.8	1.95	3.55
6	3.9	3.2	4.8	9.1	5.25	1.9	.2	.2	6.3	2.5	1.85	4.05
7	3.9	3.3	4.1	8.0	5.2	1.8	.3	.3	4.3	2.3	2.0	4.4
8	3.9	3.2	3.8	7.5	5.65	1.8	.2	.3	4.1	2.2	2.95	3.95
9	3.7	3.2	3.7	8.4	6.7	1.6	.2	.3	3.8	2.0	3.6	3.6
10	3.6	3.1	3.9	7.8	6.75	1.4	.0	1.3	3.5	1.7	4.85	3.25
11	3.5	3.1	4.9	7.1	6.35	1.3	.1	1.8	3.3	1.8	5.35	3.05
12	3.5	3.1	4.9	5.7	5.9	1.2	.1	2.5	3.1	1.7	4.5	2.9
13	3.4	3.1	5.6	5.5	4.95	1.1	.6	2.0	2.8	2.1	4.05	2.75
14	3.3	3.1	5.8	5.0	5.4	1.1	.4	1.4	2.5	2.3	4.4	2.6
15	3.3	3.0	5.5	5.3	5.25	1.0	.3	1.0	2.4	2.3	4.15	2.45
16	3.3	3.0	13.95	5.6	4.95	.9	.2	.8	2.4	2.2	3.85	2.35
17	3.3	3.0	10.4	5.4	5.4	1.1	.2	.7	2.2	2.0	3.7	2.4
18	3.3	2.9	9.7	5.2	10.95	1.4	.3	1.1	2.3	1.7	3.55	2.25
19	3.3	2.9	9.1	5.2	10.3	1.2	.5	1.3	2.2	1.7	3.3	2.5
20	3.9	3.2	8.4	5.0	7.15	.9	.3	1.3	1.9	1.6	3.25	2.65
21	3.9	3.4	8.3	5.0	5.85	.8	.5	1.2	1.9	1.6	3.15	2.45
22	3.9	3.5	10.0	4.8	5.0	.5	.9	1.0	1.9	1.6	3.2	2.5
23	3.9	3.5	9.8	4.5	4.85	.4	1.2	1.0	1.8	1.5	3.05	2.35
24	3.9	3.2	9.4	4.2	4.5	.3	1.3	.9	2.7	1.7	2.9	2.3
25	4.0	3.0	9.0	3.9	4.1	.3	1.4	1.0	5.6	2.0	2.75	2.25
26	4.2	3.7	8.2	3.9	3.9	.2	1.7	1.2	6.3	2.2	2.85	2.25
27	4.2	4.9	7.4	3.9	3.6	.2	1.5	1.1	6.6	5.0	2.7	2.2
28	4.2	5.5	6.8	3.7	3.5	.2	1.2	1.0	5.1	5.8	2.65	2.15
29	4.4	7.9	8.2	3.8	3.4	.2	1.0	1.1	5.3	6.2	2.6	2.0
30	4.5	....	9.8	4.2	3.2	.0	.6	.8	5.4	4.9	2.45	1.95
31	4.1	....	16.0	....	3.1	....	.7	.8	....	4.6	....	2.1

NOTE.—Relation of gage height to discharge affected by ice Jan. 5 to Feb. 26.

Daily discharge, in second-feet, of West Branch of Susquehanna River at Williamsport, Pa., for 1912.

[H. L. Guise, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14,500	....	27,500	71,800	33,200	6,870	370	1,090	1,820	14,900	11,000	5,620
2	13,600	....	25,900	51,600	27,000	6,580	370	775	3,050	13,600	5,750	5,490
3	13,200	....	22,400	103,000	22,600	6,300	370	775	3,740	12,800	5,360	5,100
4	11,900	....	15,800	75,600	17,600	5,750	370	630	12,800	6,580	4,470	7,780
5	....	....	14,000	39,800	15,600	4,720	370	630	22,900	6,020	3,860	8,240
6	....	....	12,800	34,000	14,700	3,740	495	495	19,500	5,230	3,620	9,860
7	....	....	10,000	28,000	14,500	3,500	630	630	10,800	4,720	3,980	11,200
8	....	....	9,030	25,400	16,500	3,500	495	630	10,000	4,470	6,440	9,520
9	....	....	8,710	30,200	21,400	3,050	495	630	9,030	3,980	8,400	8,400
10	....	....	9,360	27,000	21,600	2,620	250	2,410	8,090	3,270	13,000	7,320
11	....	....	13,200	23,400	19,700	2,410	370	3,500	7,470	3,500	15,100	6,720
12	....	....	13,200	16,700	17,600	2,210	370	5,230	6,870	3,270	11,500	6,300
13	....	....	16,200	15,800	13,400	2,010	1,090	3,980	6,020	4,220	9,860	5,880
14	....	....	17,200	13,600	15,400	2,010	775	2,620	5,230	4,720	11,200	5,490
15	....	....	15,800	14,900	14,700	1,820	630	1,820	4,970	4,720	10,200	5,100
16	....	....	68,600	16,200	13,400	1,630	495	1,440	4,970	4,470	9,200	4,840
17	....	....	41,600	15,400	15,400	2,010	495	1,260	4,470	3,980	8,710	4,970
18	....	....	37,400	14,500	45,100	2,620	630	2,010	4,720	3,270	8,240	4,600
19	....	....	34,000	14,500	41,000	2,210	930	2,410	4,470	3,270	7,470	5,230
20	....	....	30,200	13,600	23,600	1,630	630	2,410	3,740	3,050	7,320	5,620
21	....	....	29,600	13,600	17,400	1,440	930	2,210	3,740	3,050	7,020	5,100
22	....	....	39,200	12,800	13,600	930	1,630	1,820	3,740	3,050	7,170	5,230
23	....	....	38,000	11,500	13,000	775	2,210	1,820	3,500	2,830	6,720	4,840
24	....	....	35,700	10,400	11,500	630	2,410	1,630	5,750	3,270	6,300	4,720
25	....	....	33,500	9,360	10,000	630	2,620	1,820	16,200	3,980	5,880	4,600
26	....	....	29,100	9,360	9,360	495	3,270	2,210	19,500	4,470	6,160	4,600
27	....	13,200	24,900	9,360	8,400	495	2,830	2,010	20,900	13,600	5,750	4,470
28	....	15,800	21,900	8,710	8,090	495	2,210	1,820	14,000	17,200	5,620	4,340
29	....	27,500	29,100	9,030	7,780	495	1,820	2,010	14,900	19,000	5,490	3,980
30	....	....	38,000	10,400	7,170	250	1,090	1,440	15,400	13,200	5,100	3,860
31	....	....	88,400	....	6,870	....	1,260	1,440	....	11,900	....	4,220

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of West Branch of Susquehanna River at Williamsport, Pa., for 1912.

[Drainage area, 5,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	14,500	....	6,160	1.09	1.26
February	27,500	....	5,240	.929	1.00
March	88,400	8,710	27,400	4.86	5.60
April	103,000	8,710	25,000	4.43	4.94
May	45,100	6,870	17,300	3.07	3.54
June	6,870	250	2,460	.436	.49
July	3,270	250	1,060	.188	.22
August	5,230	495	1,790	.317	.37
September	22,900	1,820	9,080	1.61	1.80
October	19,000	2,830	6,760	1.20	1.38
November	15,100	3,620	7,530	1.34	1.50
December	11,200	3,860	5,910	1.05	1.21
The year	103,000	250	9,650	1.71	23.31

NOTE.—Discharge Jan. 5 to Feb. 26 estimated by comparison with other stations in the Susquehanna River basin and climatologic records: Jan. 5–31, 5,100 second-feet; Feb. 1–26, 3,700 second-feet. Monthly discharge changed slightly to conform with survey computation rules.

JUNIATA RIVER AT NEWPORT, PA.

Location.—At the steel highway bridge, about 800 feet east of the public square at Newport, 1 mile below the mouth of Buffalo Creek and about 12 miles above the mouth of the river.

Records available.—March 21, 1899, to July 15, 1906; January 6, 1907, to December 31, 1912.

Drainage area.—3,480 square miles.

Gage.—Chain, attached to the bridge; datum unchanged.

Discharge measurements.—Made from the bridge.

Winter flow.—Affected by ice.

Channel.—Conditions of flow liable to change from year to year.

Accuracy.—A good discharge rating curve has been developed for high and medium stages; low stage fair.

Cooperation.—Now maintained by Pennsylvania State Water Supply Commission, which furnished complete data for 1912.

Daily gage height, in feet, of Juniata River at Newport, Pa., for 1912.

[A. B. Bortel, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.30	4.80	5.75	8.50	7.25	4.10	3.39	3.97	3.13	4.53	3.73	3.43
2	5.40	4.73	5.05	7.65	6.60	4.00	3.45	3.75	3.18	4.25	3.55	3.45
3	5.25	4.67	4.50	8.60	6.05	4.00	3.35	3.65	3.65	4.05	3.55	3.55
4	4.85	4.65	4.38	8.05	5.65	4.00	3.30	3.50	4.20	3.88	3.57	3.65
5	4.45	4.58	4.05	7.00	5.50	4.05	3.28	3.55	4.10	3.90	3.32	3.55
6	4.25	4.37	4.05	6.40	4.98	3.72	3.25	3.47	3.80	3.77	3.55	3.77
7	3.80	4.43	3.88	5.90	5.02	3.60	3.18	3.42	3.60	3.65	3.67	4.03
8	3.35	4.35	4.02	5.65	6.35	3.60	3.22	3.40	3.55	3.55	5.40	4.45
9	3.70	4.27	4.65	5.55	7.50	3.60	3.16	3.28	3.60	3.55	5.75	4.25
10	5.05	4.35	4.95	5.35	6.80	3.60	3.25	3.55	3.45	3.55	5.20	4.06
11	5.50	4.35	4.50	5.00	5.95	3.40	3.10	3.77	3.35	3.57	4.75	3.99
12	6.05	4.23	4.35	4.80	5.55	3.35	3.12	4.05	3.30	3.65	4.60	3.90
13	6.15	4.15	4.75	4.70	9.90	3.30	3.08	3.80	3.20	3.60	4.33	3.67
14	6.20	4.17	4.82	4.60	10.90	3.30	3.09	3.55	3.10	3.62	4.23	3.70
15	5.65	4.19	8.00	4.65	8.05	3.38	3.25	3.75	3.11	3.43	4.12	3.42
16	5.70	4.13	13.60	5.00	6.70	3.42	3.13	3.60	3.13	3.47	4.05	3.70
17	5.90	4.15	9.65	4.80	10.25	3.75	3.19	3.40	3.08	3.20	3.97	3.67
18	5.75	4.17	7.85	5.85	10.60	6.80	3.28	3.40	3.18	3.39	3.90	3.67
19	5.70	4.17	7.45	8.20	8.25	5.25	3.65	3.20	3.35	3.30	3.80	3.77
20	5.68	4.35	7.30	7.60	7.10	4.55	5.05	3.20	3.37	3.30	3.75	3.80
21	5.70	4.85	8.25	6.45	6.20	4.05	4.70	3.33	3.33	3.20	3.75	3.85
22	5.70	6.75	8.60	5.85	5.65	3.85	4.68	3.36	3.25	3.25	3.73	3.70
23	5.60	6.55	9.90	5.55	5.22	3.72	6.75	3.45	3.27	3.33	3.65	3.60
24	5.70	6.70	8.10	5.65	4.92	3.70	5.50	3.50	3.72	3.30	3.77	3.45
25	5.60	6.50	8.60	5.40	4.82	3.62	4.80	3.45	7.35	3.90	3.62	3.50
26	5.70	6.78	8.70	5.40	4.50	3.50	5.30	3.43	7.05	3.90	3.60	3.50
27	5.55	11.60	8.25	5.55	4.32	3.50	5.10	3.15	6.10	4.00	3.75	3.35
28	5.40	10.10	9.15	5.70	4.40	3.50	4.40	3.27	5.55	3.85	3.53	3.50
29	5.20	7.05	10.40	5.70	4.20	3.50	4.08	3.15	5.05	3.70	3.47	3.55
30	4.92	......	12.10	6.50	4.30	3.55	3.95	3.23	4.70	3.80	3.30	3.55
31	4.88	......	10.00	......	4.20	......	3.75	3.16	......	3.65	......	3.90

NOTE.—Relation of gage height to discharge affected by ice Jan. 10 to Feb. 26.

Daily discharge, in second-feet, of Juniata River at Newport, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,690	....	8,090	17,900	13,100	3,270	1,680	2,960	1,200	4,430	2,400	1,760
2	7,000	....	5,930	14,600	10,900	3,020	1,800	2,440	1,280	3,660	2,000	1,800
3	6,540	....	4,350	18,300	9,050	3,020	1,600	2,220	2,220	3,140	2,000	2,000
4	5,340	....	4,020	16,200	7,780	3,020	1,500	1,900	3,530	2,730	2,050	2,220
5	4,210	....	3,140	12,300	7,310	3,140	1,470	2,000	3,270	2,780	1,540	2,000
6	3,660	....	3,140	10,200	5,720	2,370	1,410	1,840	2,550	2,480	2,000	2,480
7	2,550	....	2,730	8,570	5,840	2,110	1,280	1,740	2,110	2,220	2,260	3,100
8	1,600	....	3,070	7,780	10,000	2,110	1,360	1,700	2,000	2,000	7,000	4,210
9	2,330	....	4,770	7,460	14,100	2,110	1,250	1,470	2,110	2,000	8,090	3,660
10	....	....	5,640	6,840	11,600	2,110	1,410	2,000	1,800	2,000	6,380	3,140
11	....	....	4,350	5,780	8,730	1,700	1,140	2,480	1,600	2,050	5,060	3,000
12	....	....	3,940	5,200	7,460	1,600	1,180	3,140	1,500	2,220	4,630	2,780
13	....	....	5,060	4,910	23,700	1,500	1,110	2,550	1,320	2,110	3,880	2,260
14	....	....	5,260	4,630	28,100	1,500	1,130	2,000	1,140	2,150	3,610	2,330
15	....	....	16,000	4,770	16,200	1,660	1,410	2,440	1,160	1,760	3,320	1,740
16	....	....	41,100	5,780	11,200	1,740	1,200	2,110	1,200	1,840	3,140	2,330
17	....	....	22,700	5,200	25,200	2,440	1,300	1,700	1,110	1,320	2,950	2,260
18	....	....	15,400	8,410	26,800	11,600	1,470	1,700	1,200	1,680	2,780	2,260
19	....	....	13,900	16,700	16,900	6,540	2,220	1,320	1,600	1,500	2,550	2,480
20	....	....	13,300	14,400	12,600	4,490	5,930	1,320	1,640	1,500	2,440	2,550
21	....	....	16,900	10,400	9,540	3,140	4,910	1,560	1,560	1,320	2,440	2,660
22	....	....	18,300	8,410	7,780	2,660	4,850	1,620	1,410	1,410	2,400	2,330
23	....	....	23,700	7,460	6,440	2,370	11,400	1,800	1,450	1,560	2,220	2,110
24	....	....	16,400	7,780	5,550	2,330	7,310	1,900	2,370	1,500	2,480	1,800
25	....	....	18,300	7,000	5,260	2,150	5,200	1,800	13,500	2,780	2,150	1,900
26	....	....	18,700	7,000	4,350	1,900	6,690	1,760	12,400	2,780	2,110	1,900
27	....	31,300	16,900	7,460	3,850	1,900	6,080	1,230	9,210	3,020	2,440	1,600
28	....	21,600	20,600	7,930	4,070	1,900	4,070	1,450	7,460	2,660	1,960	1,900
29	....	12,400	25,900	7,930	3,530	1,900	3,220	1,230	5,930	2,330	1,840	2,000
30	....	....	33,600	10,500	3,800	2,000	2,900	1,380	4,910	2,550	1,500	2,000
31	....	....	24,100	....	3,530	....	2,440	1,250	....	2,220	....	2,780

NOTE.—Daily discharge determined from a rating curve well defined at medium and high stages and fairly well defined at low stages.

Monthly discharge of Juniata River at Newport, Pa., for 1912.

[Drainage area, 3,480 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	2,810	0.807	0.93	C.
February	31,300	....	4,360	1.25	1.35	C.
March	41,100	2,730	13,500	3.88	4.47	A.
April	18,300	4,630	9,260	2.66	2.97	A.
May	28,100	3,530	10,600	3.05	3.52	A.
June	11,600	1,500	2,780	.799	.89	B.
July	11,400	1,110	2,970	.853	.98	B.
August	3,140	1,230	1,870	.537	.62	B.
September	13,500	1,110	3,190	.917	1.02	A.
October	4,430	1,320	2,250	.647	.75	A.
November	8,090	1,500	3,050	.876	.98	A.
December	4,210	1,600	2,370	.681	.79	A.
The year	41,100	1,110	4,930	1.42	19.27	

NOTE.—Discharge Jan. 5 to Feb. 26 estimated by comparison with other stations in the Susquehanna River basin and climatologic records: Jan. 10-31, 2,150 second-feet; Feb. 1-26, 2, 30 second-feet. Monthly discharge changed slightly to conform with survey computation rules.

PATUXENT RIVER BASIN.

PATUXENT RIVER NEAR BURTONSVILLE, MD.

Location.—At the Columbia turnpike bridge, 1½ miles northeast of Burtonsville and about 5 miles northwest of Laurel.

Records available.—July 21, 1911, to June 15, 1912.

Drainage area.—127.5 square miles.

Gage.—Vertical staff fastened to bridge pier.

Discharge measurements.—From bridge or by wading.

Cooperation.—Station established, maintained, and discharge measurements and gage heights furnished by the United States Engineer Office.

Discharge measurements of Patuxent River near Burtonsville, Md., in 1911–12.

[By U. S. Engineer Office.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1911.	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 21	0.28	13.2	Sept. 18	0.60	59.8	Nov. 25	1.20	129.0
21	.28	13.5	25	.50	41.0			
28	.25	10.5	Oct. 18	2.35	303.9	1912.		
Sept. 1	1.90	288.9	21	.70	54.7	Feb. 26	1.97	288.8
7	.65	62.2						

Note.—All measurements made by wading.

Daily gage height, in feet, of Patuxent River near Burtonsville, Md., for 1911–12.

[Columbus Brashears, Observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1911.							1912.						
1		0.25	1.20	0.55	0.62	0.90	1	1.70	1.50	1.10	1.55	0.95	1.02
2		.20	1.20		.62	.80	2	1.30	1.43	1.00	1.35	.90	1.00
3			.80	.65	.60	.75	3	1.40	1.36	.90	1.85	.90	.98
4		.90	.60	.50	.58		4	1.20	1.30	.90	1.30	.85	.98
5		.88	.55	.50	.58		5	1.10	1.30	.90	1.25	.85	.98
6		.48	.65	.50	.62	.75	6		1.30	.90	1.25	.80	.98
7		1.38	.62	.50	2.75	.70	7		1.30	2.50	1.25	2.50	1.50
8		1.35	.60	.55	1.20	.70	8		1.30	1.40	1.25	1.90	1.20
9		.30		.53	.80	.70	9		1.30	1.60	1.20	1.00	1.00
10		.30	.62	.53	.78	.75	10		1.30	1.00	1.20	1.00	1.00
11		.30	.62	.53	.75	.75	11		1.20	2.30	1.20	.90	.98
12		.50	.60	.50	.75	.75	12		1.20	2.30	1.20	.86	.98
13		.32	.55	.48	.75	.75	13		1.20	6.50	1.25	.95	.98
14		.30	.50	.48	.70	.75	14		1.25	2.60	1.20	2.50	.98
15		.40	1.00	.48	1.50	1.20	15		1.30	5.50	1.10	2.00	.98
16		.35	.95	.48	1.10	1.40	16		1.30	2.40	1.10	1.90	
17		.27	.85	.50	.90	1.40	17	1.80	1.30	1.80	1.50	1.20	
18		.28	.75	1.90	1.70	1.20	18	2.00	4.90	1.65	1.30	1.00	
19		.25	.60	.90	1.20	.80	19	2.60	3.90	1.50	1.10	1.00	
20		.25	.55	.70	1.00		20	2.20	2.80	1.40	1.05	1.00	
21	0.28	.25	.55	.70	.95	.80	21	1.80	6.40	1.40	1.05	1.00	
22		.25	.53	.55	.90	.85	22	1.70	7.00	1.40	1.00	1.00	
23		.22	.53	1.50	.92	2.70	23	1.60	1.40	1.40	1.00	.98	
24		.20	.52	.90	.95	1.20	24	1.60	1.30	2.40	1.00	.98	
25	.35	.18	.50	.75	1.20	.90	25	1.75		1.80	1.00	.95	
26	.35	1.80	.48	.75	.92	2.10	26	1.75	1.98	1.80	1.00	.95	
27		3.50	.48	.75	.90	1.10	27	1.75	2.55	1.60	1.00	.95	
28	.30	2.02	.50	.75	.90	1.00	28	1.70	1.30	1.60	1.00	.95	
29	.28	.70	.65	.75	1.30	1.00	29	1.65	1.20	4.50	1.00	.95	
30	.28	1.40	.60	.70	1.00	1.10	30	1.60		3.60	.95	1.00	
31	.24	12.45		.65		3.10	31	1.55		1.80		1.90	

Daily discharge, in second-feet, of Patuxent River near Burtonsville, Md., for 1911–12.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1911.							1912.						
1	......	12	150	50	60	102	1	242	203	134	212	110	121
2	......	7	150	57	60	87	2	167	190	118	176	102	118
3	......	54	87	64	57	80	3	185	178	102	176	102	115
4	......	102	57	43	54	80	4	150	167	102	167	94	115
5	......	99	50	43	54	80	5	134	167	102	158	94	115
6	......	40	64	43	60	80	6	......	167	102	158	87	115
7	......	181	60	43	486	72	7	......	167	424	158	424	203
8	......	176	57	50	150	72	8	......	167	185	158	284	150
9	......	16	58	47	87	72	9	......	167	225	150	118	118
10	......	16	60	47	84	80	10	......	167	118	150	118	118
11	......	16	60	47	80	80	11	......	150	376	150	102	115
12	......	43	57	43	80	80	12	......	150	376	150	96	115
13	......	19	50	40	80	80	13	......	150	1,620	158	110	115
14	......	16	43	40	72	80	14	......	158	449	150	424	115
15	......	29	118	40	203	150	15	......	167	1,290	134	306	115
16	......	22	110	40	134	185	16	......	167	400	134	284	......
17	......	13	94	43	102	185	17	263	167	263	203	150	......
18	......	14	80	284	242	150	18	306	1,100	232	167	118	......
19	......	12	57	102	150	87	19	449	801	203	134	118	......
20	......	12	50	72	118	87	20	352	499	185	126	118	......
21	14	12	50	72	110	87	21	263	1,580	185	126	118	......
22	16	12	47	50	102	94	22	242	1,790	185	118	118	......
23	18	9	47	203	105	474	23	222	185	185	118	115	......
24	20	7	46	102	110	150	24	222	167	400	118	115	......
25	22	6	43	80	150	102	25	252	234	263	118	110	......
26	22	263	40	80	105	329	26	252	302	263	118	110	......
27	19	688	40	80	102	134	27	252	436	222	118	110	......
28	16	311	43	80	102	118	28	242	167	222	118	110	......
29	14	72	64	80	167	118	29	232	150	978	118	110	......
30	14	185	57	72	118	134	30	222	......	716	110	118	......
31	11	3,870	......	64	......	578	31	212	......	263	......	284	......

NOTE.—Daily discharge determined from a rating curve well defined between 10 and 1,000 second-feet, based on measurements made during 1911 to 1914 by the U. S. Engineer Office and the U. S. Geological Survey.

Monthly discharge of Patuxent River near Burtonsville, Md., for 1911–12.

[Drainage area, 127 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
July 21–31	22	11	16.9	0.133	0.05	B.
August	3,870	6	204	1.61	1.86	C.
September	150	40	66.3	.522	.58	B.
October	284	40	71.0	.559	.64	B.
November	486	54	119	.937	1.05	B.
December	578	72	138	1.09	1.26	B.
1912.						
January	449	....	199	1.57	1.81	D.
February	1,790	150	354	2.79	3.01	B.
March	1,620	102	351	2.76	3.18	B.
April	212	110	145	1.14	1.27	B.
May	424	87	154	1.21	1.40	B.
June 1–15	203	115	124	.976	.54	B.

NOTE.—Discharge computed by engineers of the U. S. Geological Survey from field data furnished by the U. S. Engineer Office. Discharge Jan. 5–16, estimated.

POTOMAC RIVER BASIN.

POTOMAC RIVER AT POINT OF ROCKS, MD.

Location.—At the steel highway bridge at Point of Rocks, about one-third mile below the mouth of Catoctin Creek and about 6 miles above the mouth of Monocacy River.

Records available.—February 17, 1895, to December 31, 1912.

Drainage area.—9,650 square miles.

Gage.—Chain, attached to bridge. Datum constant since September 2, 1902; prior to this date datum was 0.45 foot higher than at present.

Channel.—Practically permanent. The discharge is controlled by a ledge a few hundred feet below the station, the ledge extending completely across the river except for one relatively unimportant channel.

Discharge measurements.—Made from the bridge.

Winter flow.—Little affected by ice.

Canal.—The Chesapeake & Ohio Canal parallels the Potomac on the Maryland side. The average discharge of the canal is 75 to 100 second-feet. This discharge is not included in the following tables.

Accuracy.—Present discharge rating curve considered very accurate; should require relatively little change in the future.

Daily gage height, in feet, of Potomac River at Point of Rocks, Md., for 1912.

[G. H. Hickman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.5	3.3	5.9	7.6	3.6	2.3	2.5	2.5	0.86	2.5	1.25	1.05
2	5.2	3.2	4.8	6.7	3.5	2.1	2.3	2.7	1.1	2.3	1.25	1.15
3	5.0	3.2	4.1	5.6	3.4	2.3	2.2	2.6	1.35	2.1	1.2	1.05
4	4.6	3.0	3.6	5.4	3.3	2.1	2.5	1.9	1.5	1.85	1.1	1.1
5	3.8	2.8	3.3	4.9	2.8	2.0	1.9	1.8	1.35	1.65	1.1	1.2
6	2.4	2.8	3.2	4.8	2.7	2.1	1.8	1.55	2.0	1.5	1.15	1.4
7	2.3	2.8	3.0	4.5	2.6	2.2	1.85	1.4	1.3	1.65	1.15	1.45
8	2.1	2.8	2.8	3.8	4.5	2.0	1.95	1.35	1.25	1.55	1.8	1.3
9	1.9	2.6	2.8	3.6	4.6	1.8	1.85	1.6	1.2	1.35	......	1.6
10	4.7	2.5	3.0	3.4	4.0	1.85	1.75	1.45	1.25	1.3	2.6	1.65
11	5.0	2.6	3.2	3.0	3.5	1.65	1.7	1.35	1.15	1.25	2.4	1.7
12	4.9	2.6	3.0	3.0	4.6	1.75	1.8	1.55	1.1	1.15	2.3	1.75
13	4.8	2.6	3.6	2.6	8.8	1.85	1.9	1.6	1.05	1.05	1.8	1.45
14	4.4	2.4	4.4	2.6	11.6	1.6	1.65	1.7	1.15	1.45	1.65	1.3
15	4.4	2.5	5.9	3.0	7.6	1.75	1.95	1.6	.96	1.2	1.6	1.15
16	4.3	2.7	12.0	3.0	6.3	2.6	1.7	1.35	1.0	1.15	1.45	1.45
17	4.3	2.7	13.0	2.9	9.0	2.3	1.65	1.3	.91	1.2	1.45	1.55
18	4.3	2.6	8.7	3.8	11.1	2.4	2.8	1.35	.96	1.05	1.45	1.5
19	4.3	2.9	6.5	4.7	7.0	2.3	2.4	1.25	1.0	1.15	1.4	1.6
20	4.5	3.0	5.8	6.0	6.3	2.3	2.3	1.3	1.0	1.2	1.3	1.55
21	4.0	3.2	5.7	4.8	5.0	2.0	3.0	1.25	.96	1.25	1.2	1.5
22	4.0	4.0	10.4	4.4	4.0	1.85	3.2	1.3	1.05	1.15	1.15	1.35
23	4.9	5.7	9.3	4.0	3.8	1.85	3.5	1.25	1.05	1.2	1.15	1.45
24	4.8	8.2	7.1	3.6	3.5	2.0	3.6	1.2	3.1	1.2	1.1	1.5
25	4.7	6.6	7.9	3.4	3.3	2.2	3.0	1.2	7.4	1.15	1.15	1.45
26	4.7	6.8	8.0	3.2	3.0	2.2	8.8	1.2	7.9	1.05	1.2	1.55
27	4.7	12.6	6.8	3.2	2.9	2.1	5.7	1.2	5.1	1.2	1.05	1.55
28	4.0	13.0	5.9	3.3	2.6	2.1	4.1	1.2	3.5	1.3	1.15	1.6
29	3.9	8.6	6.3	3.4	2.5	2.3	3.1	1.2	3.3	1.25	1.1	1.65
30	3.4	......	9.7	3.5	2.4	2.1	2.9	1.05	2.9	1.2	1.05	1.7
31	3.4	......	9.9	......	2.3	......	2.6	1.1	......	1.25	......	2.8

NOTE.—Relation of gage height to discharge affected by ice Jan. 10-29 and Feb. 23-26.

Daily discharge, in second-feet, of Potomac River at Point of Rocks, Md., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	16,800	10,500	25,500	37,100	12,000	6,130	6,920	6,920	1,640	6,920	2,660	2,120
2	21,100	10,000	18,600	30,800	11,500	5,380	6,130	7,750	2,250	6,120	2,660	2,380
3	19,800	10,000	14,600	23,600	11,000	6,130	5,750	7,330	2,940	5,380	2,520	2,120
4	17,400	9,070	12,000	22,300	10,500	5,380	6,920	4,670	3,390	4,500	2,250	2,250
5	13,000	8,180	10,500	19,200	8,180	5,020	4,670	4,330	2,940	3,860	2,250	2,520
6	6,520	8,180	10,000	18,600	7,750	5,380	4,330	3,540	5,020	3,390	2,380	3,090
7	6,130	8,180	9,070	16,800	7,330	5,750	4,500	3,090	2,800	3,860	2,380	3,240
8	5,380	8,180	8,180	13,000	16,800	5,020	4,840	2,940	2,660	3,540	4,330	2,800
9	4,670	7,330	8,180	12,000	17,400	4,330	4,500	3,700	2,520	2,940	5,830	3,700
10	......	6,920	9,070	11,000	14,100	4,500	4,170	3,240	2,660	2,800	7,330	3,860
11	......	7,330	10,000	9,070	11,500	3,860	4,010	2,940	2,380	2,660	6,520	4,010
12	......	7,330	9,070	9,070	17,400	4,170	4,330	3,540	2,250	2,380	6,130	4,170
13	......	7,330	12,000	7,330	46,000	4,500	4,670	3,700	2,120	2,120	4,330	3,240
14	......	6,520	16,300	7,330	68,900	3,700	3,860	4,010	2,390	3,240	3,860	2,800
15	......	6,920	25,500	9,070	37,100	4,170	4,840	3,700	1,890	2,520	3,700	2,380
16	......	7,750	72,200	9,070	28,100	7,330	4,010	2,940	1,990	2,380	3,240	3,240
17	......	7,750	80,500	8,620	47,600	6,130	3,860	2,800	1,760	2,520	3,240	3,540
18	......	7,330	45,300	13,000	64,700	6,520	8,180	2,940	1,890	2,120	3,240	3,390
19	......	8,620	29,400	18,000	32,800	6,130	6,520	2,660	1,990	2,380	3,090	3,700
20	......	9,070	24,800	26,100	28,100	6,130	6,130	2,800	1,990	2,520	2,800	3,540
21	......	10,000	24,200	18,600	19,800	5,020	9,070	2,660	1,890	2,660	2,520	3,390
22	......	14,100	58,900	16,300	14,100	4,500	10,000	2,800	2,120	2,380	2,380	2,940
23	......	18,000	50,000	14,100	13,000	4,500	11,500	2,660	2,120	2,520	2,380	3,240
24	......	20,000	33,500	12,000	11,500	5,020	12,000	2,520	9,530	2,520	2,250	3,390
25	......	24,000	39,200	11,000	10,500	5,750	9,070	2,520	35,600	2,380	2,380	3,240
26	......	26,000	40,000	10,000	9,070	5,750	46,000	2,520	39,200	2,120	2,520	3,540
27	......	77,200	31,500	10,000	8,620	5,380	24,200	2,520	20,400	2,520	2,120	3,540
28	......	80,500	25,500	10,500	7,330	5,380	14,600	2,520	11,500	2,800	2,380	3,700
29	......	44,500	28,100	11,000	6,920	6,130	9,530	2,520	10,500	2,660	2,250	3,860
30	11,000	......	53,200	11,500	6,520	5,380	8,620	2,120	8,620	2,520	2,120	4,010
31	11,000	......	54,800	......	6,130	......	7,330	2,250	......	2,660	......	8,180

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Feb. 23–26, estimated.

Monthly discharge of Potomac River at Point of Rocks, Md., for 1912.

[Drainage area, 9,650 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	21,100	4,670	9,450	0.979	1.13	D.
February	80,500	6,520	16,400	1.70	1.83	C.
March	80,500	8,180	28,700	2.97	3.42	A.
April	37,100	7,330	14,900	1.54	1.72	A.
May	68,900	6,130	19,800	2.05	2.36	A.
June	7,330	3,700	5,280	.547	.61	A.
July	46,000	3,860	8,550	.886	1.02	A.
August	7,750	2,120	3,460	.359	.41	A.
September	39,200	1,640	6,360	.659	.74	A.
October	6,920	2,120	3,090	.320	.37	A.
November	7,330	2,120	3,270	.339	.38	A.
December	8,180	2,120	3,390	.351	.40	A.
The year	80,500	1,640	10,200	1.06	14.39	

NOTE.—Mean discharge Jan. 10–29 estimated 8,000 second-feet because of ice.

MONOCACY RIVER NEAR FREDERICK, MD.

Location.—At the county bridge on the toll road leading from Frederick to Mount Pleasant, Md., about 3,000 feet below the mouth of Tuscarora Creek (entering from the right) and about 2,000 feet above Israel Creek (entering from the left).

Records available.—August 4, 1896, to December 31, 1912.

Drainage area.—660 square miles.

Gage.—Chain, attached to the bridge; datum unchanged.

Channel.—Liable to change somewhat from year to year.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—More or less affected by ice.

Accuracy.—Changes in rating curve are required by change in conditions of flow.

Daily gage height, in feet, of Monocacy River near Frederick, Md., for 1912.

[E. L. Derr, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.5	5.6	7.5	7.6	6.5	4.9	4.9	4.7	4.3	6.3	4.4	4.4
2	7.5	5.6	6.9	7.4	5.7	4.8	4.7	4.9	4.3	5.8	4.4	4.4
3	6.5	5.6	6.2	8.5	5.5	4.7	4.6	4.6	4.3	5.3	4.5	4.5
4	6.3	5.5	5.9	6.7	5.4	4.7	4.6	4.5	4.6	5.2	4.3	4.7
5	6.1	5.6	5.5	6.5	5.3	4.7	4.7	4.3	4.5	5.1	4.5	4.7
6	5.9	5.9	5.7	6.4	5.3	4.7	4.6	4.4	4.4	5.0	4.5	5.3
7	6.0	5.8	5.9	6.2	6.4	4.7	4.6	4.3	4.4	4.9	4.5	6.8
8	6.4	5.8	6.4	8.2	6.2	4.7	4.5	4.3	4.5	4.8	7.5	5.1
9	7.0	5.8	6.6	6.9	6.7	4.7	4.4	4.7	4.4	4.8	6.3	5.0
10	7.0	5.8	6.5	6.5	6.4	4.6	4.3	4.7	4.3	4.7	5.2	4.9
11	6.9	5.9	6.3	6.3	5.7	4.5	4.4	9.1	4.3	4.7	5.2	4.7
12	6.5	5.9	6.0	5.8	6.0	4.5	4.7	8.5	4.2	4.7	5.0	4.5
13	6.5	5.8	13.5	5.8	6.5	4.5	5.3	6.9	4.0	4.7	4.8	4.3
14	6.5	5.8	13.8	6.9	5.7	4.5	5.0	4.9	4.0	4.6	4.7	4.3
15	6.5	5.8	17.4	6.1	5.7	4.5	4.7	4.6	4.0	4.6	4.6	4.5
16	6.4	5.7	19.4	7.1	5.7	5.0	4.6	4.6	4.0	4.5	4.6	4.5
17	6.4	5.5	9.7	7.0	7.5	4.9	4.6	4.5	4.0	4.5	4.6	4.5
18	5.9	5.3	8.5	7.4	6.9	4.8	8.6	4.5	4.0	4.5	4.5	4.6
19	6.0	5.2	8.2	7.1	5.7	4.8	7.6	4.5	4.2	4.5	4.5	5.4
20	6.2	7.1	8.0	6.4	5.3	4.8	5.0	4.5	4.1	4.5	4.5	5.3
21	6.1	7.5	8.7	6.2	5.4	4.7	5.0	4.8	4.1	4.5	4.5	5.2
22	5.9	18.5	8.3	5.9	5.3	4.6	6.3	4.6	4.1	4.6	4.5	5.2
23	5.9	9.0	7.5	5.8	5.2	4.6	5.6	4.5	4.25	4.7	4.5	5.2
24	5.9	7.1	12.9	5.6	5.1	4.6	5.5	4.5	7.0	4.9	4.5	5.3
25	5.7	6.5	12.0	.5	5.1	5.2	6.0	4.5	22.7	4.9	4.5	5.5
26	5.7	14.1	9.5	5.5	5.0	5.2	5.5	4.4	18.5	4.7	4.5	5.6
27	5.6	15.4	8.4	6.0	4.8	7.7	5.1	4.3	7.9	4.6	4.5	6.3
28	5.5	9.5	7.4	5.9	4.8	5.7	4.9	4.3	7.5	4.6	4.5	6.7
29	5.5	8.9	18.0	5.8	4.8	5.2	4.7	4.3	6.9	4.6	4.4	6.0
30	5.5	......	10.9	6.9	5.0	5.0	4.9	4.3	6.5	4.5	4.4	10.6
31	5.5	......	8.5	......	5.0	......	4.8	4.3	......	4.4	......	15.0

NOTE.—Relation of gage height to discharge affected by ice Jan. 7-27 and Feb. 6-17.

Daily discharge, in second-feet, of Monocacy River near Frederick, Md., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,160	846	2,280	2,370	1,440	484	484	398	250	1,300	284	284
2	2,280	846	1,760	2,190	904	440	398	484	250	964	284	284
3	1,440	846	1,220	3,200	790	398	358	358	250	680	320	320
4	1,300	790	1,030	1,600	734	398	358	320	358	628	320	398
5	1,160	846	790	1,440	680	398	398	250	320	578	320	398
6	1,030	......	904	1,360	680	398	358	284	284	530	320	680
7	......	......	1,030	1,220	1,360	398	358	250	284	484	320	1,680
8	......	......	1,360	2,920	1,220	398	320	250	320	440	2,280	578
9	......	......	1,520	1,760	1,600	398	284	398	284	440	1,300	530
10	......	......	1,440	1,440	1,360	358	250	398	250	398	628	484

Daily discharge, in second-feet, of Monocacy River near Frederick, Md., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11			1,300	1,300	904	320	284	3,780	250	398	628	398
12			1,090	964	1,090	320	398	3,200	218	398	530	320
13			8,180	964	1,440	320	680	1,760	158	398	440	250
14			8,490	1,760	904	320	530	484	158	358	398	250
15			12,300	1,160	904	320	398	358	158	358	358	320
16			14,400	1,940	904	530	358	358	158	320	358	320
17			4,340	1,850	2,280	484	358	320	158	320	358	320
18		680	3,200	2,190	1,760	440	3,300	320	158	320	320	358
19		628	2,920	1,940	904	440	2,370	320	218	320	320	734
20		1,940	2,730	1,360	680	440	530	320	188	320	320	680
21		2,280	3,400	1,220	734	398	530	440	188	320	320	628
22		13,400	3,020	1,030	680	358	1,300	358	188	358	320	628
23		3,680	2,280	964	628	358	846	320	234	398	320	268
24		1,940	7,540	846	578	358	790	320	1,850	484	320	680
25		1,440	6,610	790	578	628	1,090	320	17,800	484	320	790
26		8,800	4,160	790	530	628	790	284	13,400	398	320	846
27		10,200	3,110	1,090	440	2,460	578	250	2,640	358	320	1,300
28	790	4,160	2,190	1,030	440	904	484	250	2,280	358	320	1,600
29	790	3,580	12,900	964	440	628	398	250	1,760	358	284	1,090
30	790		5,510	1,760	530	530	484	250	1,440	320	284	5,210
31	790		3,200		530		440	250		284		9,750

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Monocacy River near Frederick, Md., for 1912.

[Drainage area, 660 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	4,160	790	1,010	1.53	1.76	D.
February	13,400	628	2,230	3.38	3.64	D.
March	14,400	790	4,070	6.17	7.11	B.
April	3,200	790	1,510	2.29	2.56	B.
May	2,280	440	924	1.40	1.61	B.
June	2,460	320	508	.770	.86	B.
July	3,300	250	661	1.00	1.15	B.
August	3,780	250	577	.874	1.01	B.
September	17,800	158	1,550	2.35	2.62	B.
October	1,300	284	454	.688	.79	B.
November	2,280	284	451	.683	.76	B.
December	9,750	250	1,060	1.61	1.86	B.
The year	17,800	158	1,250	1.89	25.73	

NOTE.—Mean discharge Jan. 7-27 estimated 800 second-feet. Mean discharge Feb. 6-17 estimated 650 second-feet.

GOOSE CREEK NEAR LEESBURG, VA.

Location.—At Evergreen Mills about 7 miles directly south of Leesburg (the most convenient railroad station), about 1 mile below the mouth of Little River and 10 miles above the mouth of Goose Creek.

Records available.—July 12, 1909, to December 31, 1912.

Drainage area.—338 square miles.

Gage.—Vertical staff, spiked to a tree on the left bank immediately below the tailrace of the mill.

Channel.—Fairly permanent.

Discharge measurements.—Made between the mill and the dam, either by wading or from the highway bridge. The discharge of the mill race is also measured and added to the discharge between the mill and the dam.

Artificial control.—The dam at this point is of timber and rock and at low stages most of the water passes through it. The mill race carries water at all times, three or four times more when the mill is running than when it is idle. This variation in flow causes variation in the gage heights ranging from a few hundredths to about 0.15 foot; but as the mill is run only four or five hours a day the fluctuation has a relatively small effect on the accuracy of estimates.

Daily gage height, in feet, of Goose Creek near Leesburg, Va., for 1912.

[J. O. Daniel, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	1.6	3.6	3.8	2.4	2.6	2.2	2.7	1.0	2.9	1.3	1.2
2	3.4	1.6	3.5	3.4	2.4	2.8	2.15	2.7	.75	2.8	1.3	1.22
3	3.4	1.55	3.0	3.6	2.4	2.8	2.1	2.9	.6	2.8	1.3	1.22
4	3.4	1.55	2.8	3.2	2.5	2.7	2.05	2.8	.6	2.8	1.3	1.2
5	3.2	1.5	2.6	3.1	2.5	2.5	2.15	2.8	.6	2.5	1.28	1.3
6	3.2	1.5	2.5	2.8	2.5	3.3	2.1	3.0	.75	2.2	1.28	1.3
7	3.0	1.5	2.8	3.2	2.6	2.7	2.0	2.9	1.2	2.0	1.27	1.3
8	2.8	1.48	2.8	2.8	2.8	2.6	1.8	2.8	1.6	1.75	1.25	1.28
9	2.6	1.48	2.6	2.3	2.7	2.6	1.4	2.8	1.5	1.3	1.25	1.28
10	2.4	1.46	2.6	2.4	2.7	2.6	1.2	2.4	1.0	1.3	1.26	1.26
11	2.15	1.5	2.6	2.35	4.0	2.5	1.0	2.2	.8	1.3	1.26	1.2
12	2.1	1.5	3.0	2.45	4.5	2.4	1.1	2.0	.6	1.3	1.26	1.2
13	2.05	1.48	4.5	2.3	5.0	2.4	1.2	1.9	.4	1.3	1.26	1.2
14	2.05	1.46	4.0	2.2	5.5	2.4	1.4	1.8	.3	1.3	1.26	1.2
15	2.0	1.46	5.5	2.1	4.0	2.5	1.4	2.0	.3	1.3	1.26	1.2
16	2.0	1.48	4.6	2.1	3.8	3.0	1.5	1.8	.3	1.3	1.26	1.4
17	1.85	1.5	4.0	2.2	4.0	3.5	1.6	1.4	.3	1.3	1.26	1.4
18	1.8	1.6	3.5	2.4	3.3	2.9	1.65	1.3	.5	1.3	1.26	1.38
19	1.8	1.6	2.8	2.5	5.0	3.1	1.65	1.2	2.1	1.3	1.26	1.36
20	1.85	2.5	2.6	2.6	4.8	3.2	1.65	1.0	2.1	1.3	1.26	1.35
21	1.8	2.7	2.3	2.5	4.2	3.1	1.65	.95	2.2	1.3	1.26	1.35
22	1.8	3.0	2.6	2.5	3.4	3.0	1.7	.95	2.2	1.3	1.26	1.35
23	1.8	4.5	2.8	2.5	3.2	3.0	1.7	1.0	3.0	1.25	1.26	1.35
24	1.7	4.0	2.9	2.45	2.7	2.8	2.1	.85	......	1.25	1.24	1.38
25	1.7	3.5	2.7	2.4	2.5	2.8	2.0	.85	......	1.25	1.24	1.4
26	1.7	3.6	2.7	2.5	2.4	2.7	1.8	.85	5.0	1.25	1.23	1.45
27	1.65	5.0	2.5	2.4	2.4	2.6	1.7	1.0	4.0	1.3	1.22	1.5
28	1.65	4.0	2.45	2.6	2.6	2.5	1.7	1.2	3.0	1.3	1.2	1.5
29	1.65	3.8	6.0	2.5	2.8	2.2	1.7	1.2	3.0	1.3	1.2	1.5
30	1.65	......	4.5	2.5	2.7	2.25	1.9	1.2	3.0	1.3	1.2	8.5
31	1.65	......	3.0	......	2.7	......	2.8	1.2	......	1.3	......	5.0

NOTE.—Relation of gage height to discharge affected by ice during parts of January and February. On Sept. 24 and 25 water was above the gage which reads to 16.0 feet.

Daily discharge, in second-feet, of Goose Creek near Leesburg, Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	944	240	985	1,070	513	588	441	626	84	704	155	130
2	903	240	944	903	513	665	423	626	42	665	155	135
3	903	225	743	985	513	665	405	704	25	665	155	135
4	903	225	665	823	550	626	388	665	25	665	155	130
5	823	210	588	783	550	550	423	665	25	550	150	155
6	823	210	550	665	550	863	405	743	42	441	150	155
7	743	210	665	823	588	626	370	704	130	370	148	155
8	665	204	665	665	665	588	303	665	240	287	142	150
9	588	204	588	477	626	588	182	665	210	155	142	150
10	513	199	588	513	626	588	130	513	84	155	145	145
11	423	210	588	495	1,150	550	84	441	49	155	145	130
12	405	210	743	532	1,370	513	106	370	25	155	145	130
13	388	204	1,370	477	1,590	513	130	336	11	155	145	130
14	388	199	1,150	441	1,820	513	182	303	7	155	145	130
15	370	199	1,820	405	1,150	550	182	370	7	155	145	130

Daily discharge, in second-feet, of Goose Creek near Leesburg, Va., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	370	204	1,410	405	1,070	743	210	303	7	155	145	182
17	320	210	1,150	441	1,150	944	240	182	7	155	145	182
18	303	240	944	513	863	704	256	155	17	155	145	177
19	303	240	665	550	1,590	783	256	130	405	155	145	171
20	320	550	588	588	1,500	823	256	84	405	155	145	168
21	303	626	477	550	1,240	783	256	74	441	155	145	168
22	303	743	588	550	903	743	271	74	441	155	145	168
23	303	1,370	665	550	823	743	271	84	743	142	145	168
24	271	1,150	704	532	626	665	405	57	7,000	142	140	177
25	271	944	626	513	550	665	370	57	7,000	142	140	182
26	271	985	626	550	513	626	303	57	1,590	142	138	196
27	256	1,590	550	513	513	588	271	84	1,150	155	135	210
28	256	1,150	532	588	588	550	271	130	743	155	130	210
29	256	1,070	2,040	550	665	441	271	130	743	155	130	210
30	256	....	1,370	550	626	459	336	130	743	155	130	3,160
31	256	....	743	....	626	....	665	130	....	155	....	1,590

NOTE.—Daily discharge determined from a rating curve well defined between 50 and 1,400 second-feet. Discharge may be somewhat in error at times during January and February because of ice. Discharge Sept. 24 and 25 estimated.

Monthly discharge of Goose Creek near Leesburg, Va., for 1912.

[Drainage area, 338 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	944	256	465	1.38	1.59	D.
February	1,590	199	492	1.46	1.58	D.
March	2,040	477	849	2.51	2.89	B.
April	1,070	405	600	1.78	1.99	B.
May	1,820	513	859	2.54	2.93	B.
June	944	441	642	1.90	2.12	B.
July	665	84	292	.864	1.00	B.
August	743	57	331	.979	1.13	B.
September	[a] 7,000	7	748	2.21	2.47	D.
October	704	142	254	.751	.87	B.
November	155	130	144	.426	.48	C.
December	3,160	130	304	.899	1.04	B.
The year	7,000	7	498	1.47	20.09	

[a] Estimated.

NORTHEAST BRANCH OF ANACOSTIA RIVER AT HYATTSVILLE, MD.

Location.—Just above a highway bridge in eastern part of Hyattsville and about 2,800 feet upstream from the Washington-Baltimore turnpike bridge.

Records available.—July 1, 1911, to September 22, 1912.

Drainage area.—75 square miles.

Gage.—Vertical staff with zero at elevation 6.28 feet above United States Engineer Office mean low-water datum.

Channel.—Gravel; probably permanent.

Discharge measurements.—By wading, or from bridge below station.

Cooperation.—Station established, maintained, and records furnished by United States Engineer Office.

Daily gage height, in feet, and discharge, in second-feet, of Northeast Branch of Anacostia River at Hyattsville, Md., for 1911.

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.80	6.8	0.73	4.3	1.58	124.1	0.89	11.0	1.00	22.0	1.27	62.5
2	.80	6.8	.71	3.7	1.38	81.9	.97	16.5	.97	18.5	1.21	52.4
3	.80	6.8	.72	4.0	1.25	59.1	.96	16.0	.96	17.5	1.16	44.6
4	.80	6.8	1.68	153.3	.96	17.5	.91	12.3	.97	18.5	1.14	41.6
5	.80	6.8	1.25	59.1	.95	16.6	.87	10.0	.96	17.5	1.12	38.5
6	.80	6.8	.97	18.5	.94	15.6	.88	10.5	1.03	25.9	1.11	37.0
7	.80	6.8	.85	9.3	.92	14.0	.90	12.0	1.83	175.0	1.10	35.5
8	.80	6.8	.80	6.8	.99	20.7	.92	13.0	1.28	64.3	1.10	35.5
9	.80	6.8	.79	6.4	.94	15.6	.89	11.0	1.15	43.1	1.10	35.5
10	.80	6.8	.78	6.0	.96	17.5	.88	10.5	1.11	37.0	1.10	35.5
11	.80	6.8	.76	5.2	1.04	27.4	.92	13.0	1.09	34.0	1.09	34.0
12	.72	4.0	.83	8.3	.96	17.5	.92	13.0	1.10	35.5	1.08	32.5
13	.76	5.2	.81	7.3	.90	12.2	.89	11.0	1.23	55.6	1.07	31.2
14	.74	4.6	.81	7.3	.86	9.8	.86	9.5	1.53	111.7	1.07	30.0
15	.85	9.3	.83	8.3	1.16	44.6	.86	9.5	1.65	143.0	1.38	81.9
16	.81	7.3	.89	11.6	1.14	41.6	.90	12.0	1.32	71.0	1.99	211.0
17	.87	10.4	.81	7.3	1.04	27.4	.90	12.0	1.23	55.6	1.27	62.5
18	.88	11.0	.83	8.3	.94	15.6	2.42	308.0	1.66	147.0	1.33	72.8
19	.80	6.8	.81	7.3	.92	14.0	1.37	72.0	1.51	107.4	1.23	55.6
20	.79	6.4	.76	5.2	.91	13.5	1.11	29.3	1.33	72.8	1.22	54.0
21	.78	6.0	.74	4.6	.89	11.6	1.05	23.0	1.21	52.4	1.19	49.2
22	.79	6.4	.74	4.6	.91	13.5	1.12	28.0	1.11	37.0	1.35	76.3
23	.75	5.0	.73	4.3	.90	12.2	1.53	111.7	1.07	31.2	2.53	336.0
24	.75	5.0	.72	4.0	.88	11.0	1.26	59.0	1.16	44.6	1.60	129.5
25	.70	3.5	.92	14.0	.89	11.6	1.11	30.5	1.54	114.6	1.57	121.5
26	.73	4.3	1.79	167.0	.87	10.4	1.07	25.0	1.33	72.8	1.46	97.3
27	.73	4.3	1.06	30.0	.85	9.3	1.04	23.0	1.23	55.6	2.33	287.0
28	.74	4.6	.93	14.8	.86	9.8	1.00	22.0	1.71	163.0	1.52	110.0
29	.73	4.3	1.02	24.5	.93	14.8	1.00	22.0	1.93	197.0	1.33	72.8
30	.71	3.7	1.33	72.8	.93	14.8	1.00	22.0	1.40	85.6	1.32	71.0
31	.71	3.7	2.81	404.0	......	......	1.00	22.0	......	......	2.83	414.0

Daily gage height, in feet, of Northeast Branch of Anacostia River at Hyattsville, Md., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.99	1.60	1.12	1.68	1.27	1.36	1.37	1.25	1.05
2	1.45	1.34	.97	1.65	1.24	1.30	1.31	1.21	1.00
3	1.38	1.31	.92	2.17	1.24	1.46	1.29	1.20	1.22
4	1.34	1.22	.87	1.71	1.20	1.40	1.26	1.20	1.11
5	1.32	1.41	.87	1.58	1.20	1.36	1.23	1.15	1.09
6	1.70	1.30	.90	1.51	1.30	1.55	1.19	1.15	1.03
7	1.37	1.34	1.00	1.49	7.30	1.57	1.19	1.15	.99
8	1.50	1.20	1.26	1.75	3.44	1.38	1.17	1.14	1.33
9	1.34	1.30	1.21	1.51	1.93	1.35	1.14	1.13	1.10
10	1.38	1.32	1.08	1.42	1.82	1.31	1.05	1.25	1.00
11	1.27	1.26	.95	1.37	1.80	1.30	1.27	1.22	.94
12	1.30	1.22	1.75	1.34	2.16	1.30	1.24	1.15	.92
13	1.47	1.12	5.00	1.55	2.30	1.30	1.20	1.12	.91
14	1.60	1.17	2.08	1.47	1.91	1.28	1.15	1.15	1.00
15	1.37	1.13	4.30	1.41	1.89	1.28	2.12	1.13	1.01
16	1.44	.99	5.10	1.50	3.21	2.05	1.48	1.09	1.77
17	1.33	1.06	1.60	1.58	2.70	2.20	1.40	1.08	1.19
18	1.40	1.30	1.73	2.25	2.05	1.55	1.32	1.01	1.13
19	2.80	4.00	1.62	2.10	1.79	1.35	1.73	1.14	1.70
20	4.24	2.50	1.57	1.60	1.67	1.40	1.39	1.45	1.42
21	3.68	3.00	1.52	1.42	1.60	1.15	1.31	1.25	1.18
22	2.65	2.75	1.42	1.44	1.55	1.10	1.73	1.15	1.01
23	1.99	2.02	1.39	1.50	1.53	1.10	1.35	1.13	....
24	1.51	1.60	3.07	1.37	1.53	1.28	1.54	1.08	....
25	1.28	1.53	2.35	1.32	1.49	1.33	1.87	1.02	....
26	1.25	2.17	1.70	1.30	1.44	1.30	1.47	1.01	....
27	1.43	4.43	1.56	1.30	1.41	4.90	1.32	1.04	....
28	1.51	2.18	1.47	1.33	1.41	1.65	1.25	.99	....
29	1.65	1.70	4.95	1.28	1.46	1.43	1.28	1.12	....
30	2.59	....	3.30	1.31	1.45	1.21	1.45	1.08	....
31	1.80	....	2.02	....	1.46	....	1.25	1.03	....

Daily discharge, in second-feet, of Northeast Branch of Anacostia River at Hyattsville, Md., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	211.0	129.6	32.3	133.2	55.2	70.3	44.5	28.0	8.0
2	95.5	74.6	14.5	126.1	50.1	60.0	36.0	23.0	4.8
3	81.9	69.2	10.6	241.0	50.1	89.0	33.0	21.5	24.0
4	74.6	54.0	7.5	138.9	44.0	77.4	29.0	21.5	12.0
5	71.0	87.6	7.5	111.5	44.0	70.3	25.0	16.0	10.5
6	160.0	67.5	9.5	98.3	60.0	105.9	20.5	16.0	6.5
7	80.0	74.6	17.3	94.7	1,758.0	109.6	20.5	16.0	4.0
8	106.0	50.8	53.0	148.8	515.3	74.0	18.0	15.0	38.5
9	74.6	67.5	45.6	98.3	188.6	68.6	15.0	14.0	11.0
10	81.9	71.0	26.9	81.0	164.8	61.7	8.0	28.0	4.8
11	62.5	61.0	12.6	72.1	160.0	60.0	30.5	24.0	3.0
12	67.5	54.0	149.0	67.0	238.2	60.0	26.3	16.3	2.2
13	99.0	38.5	964.0	105.7	268.0	60.0	21.5	13.0	2.0
14	129.5	46.1	220.0	90.9	184.2	56.9	16.0	16.0	4.8
15	80.0	39.9	765.0	79.2	180.0	56.9	195.0	14.0	5.5
16	93.5	20.7	992.0	96.5	482.4	214.0	63.0	10.5	117.0
17	72.8	30.0	115.6	111.5	361.0	220.0	49.5	10.0	20.5
18	85.8	67.5	141.0	258.0	214.0	75.2	37.0	5.5	14.0
19	400.0	717.0	120.5	225.0	157.9	42.0	110.0	15.0	101.5
20	786.0	328.0	104.1	116.5	130.9	49.5	48.0	58.0	53.0
21	630.0	432.0	102.0	81.0	116.5	16.0	36.0	28.0	19.5
22	365.0	373.0	81.0	85.0	105.8	11.0	110.0	16.0	5.5
23	211.0	207.0	75.7	96.5	102.0	11.0	42.0	14.0	....
24	107.3	96.5	448.0	72.1	102.0	31.5	74.0	10.0	....
25	64.1	102.0	280.0	63.4	94.7	38.5	138.0	6.0	....
26	59.1	240.0	138.0	60.0	85.0	34.5	61.5	5.5	....
27	91.6	800.0	107.7	60.0	79.2	886.0	37.0	7.0	....
28	107.3	243.0	92.8	65.2	79.2	94.0	28.0	4.0	....
29	144.0	137.7	948.0	56.9	89.0	54.5	31.5	13.0	....
30	350.0	....	504.0	61.7	87.0	23.0	58.0	10.0	....
31	193.0	....	208.0	....	89.0	....	28.0	6.5	....

Monthly discharge of Northeast Branch of Anacostia River at Hyattsville, Md., for 1911-12.

[Drainage area, 75 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1911.					
July	11.0	3.5	6.15	0.08	0.09
August	404.0	3.7	35.23	.47	.54
September	124.1	9.3	24.17	.32	.36
October	308.0	9.5	32.27	.43	.50
November	197.0	17.5	70.89	.95	1.05
December	414.0	30.0	91.89	1.23	1.41
1912.					
January	786	59.1	169	2.25	2.59
February	800	20.7	165	2.20	2.37
March	992	7.5	219	2.92	3.37
April	258	56.9	107	1.43	1.60
May	1,758	44.0	204	2.72	3.14
June	886	11.0	96.0	1.28	1.43
July	195	8.0	48.1	.641	.74
August	58.0	4.0	16.2	.216	.25
September 1-22	117	2.0	21.6	.288	.24

NORTHWEST BRANCH OF ANACOSTIA RIVER AT BLADENSBURG, MD.

Location.—About 300 feet above the Washington & Maryland Railway Co.'s bridge and about half a mile northwest of Bladensburg.

Records available.—July 1, 1911, to September 22, 1912.

Drainage area.—52 square miles.

Gage.—Vertical staff on left bank. Gage zero is 4.59 feet above United States Engineer Office mean low-water datum.

Channel.—Sandy and probably shifting.

Discharge measurements.—Made by wading or from a gaging bridge.

Cooperation.—Station established, maintained, and records furnished by the United States Engineer Office.

Daily gage height in feet and discharge, in second-feet of Northwest Branch of Anacostia River at Bladensburg, Md., for 1911.

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.60	4.8	0.52	3.4	2.95	273.0	0.76	8.3	0.90	13.2	1.28	36.3
2	.60	4.8	.49	3.0	3.94	473.0	.78	8.8	.86	11.6	1.11	23.9
3	.60	4.8	.55	3.9	1.93	104.0	.77	8.5	.81	9.8	1.02	19.0
4	.60	4.8	1.87	96.3	1.72	78.0	.81	9.8	.85	11.2	.99	17.4
5	.60	4.8	1.20	30.2	1.24	33.2	.80	9.5	.94	15.0	.97	16.4
6	.60	4.8	.91	13.6	.99	17.4	.75	8.0	1.98	110.8	.95	15.4
7	.60	4.8	.71	7.0	.98	16.9	.72	7.3	1.52	56.9	.90	13.2
8	.60	4.8	.65	5.8	.93	14.5	.69	6.6	1.25	34.0	.92	14.1
9	.60	4.8	.60	4.8	.83	10.5	.68	6.4	1.15	27.6	.95	15.4
10	.60	4.8	.59	4.6	.80	9.5	.66	6.0	1.12	24.6	.89	12.8
11	.60	4.8	.58	4.4	.82	10.2	.75	8.0	1.05	20.6	.97	16.4
12	.60	4.8	.59	4.6	.75	8.0	.81	9.8	1.18	28.7	1.05	20.4
13	.59	4.6	.60	4.8	.68	6.4	.79	9.1	1.23	34.0	1.00	18.0
14	.59	4.6	.65	5.8	.65	5.8	.75	8.0	1.65	70.0	1.02	19.0
15	.68	6.4	.71	7.0	1.13	25.3	.79	9.1	1.75	81.5	1.35	42.0
16	.72	7.3	.68	6.4	.99	17.4	.78	8.8	1.61	65.4	1.61	65.4
17	.75	8.0	.64	5.6	.95	15.4	.78	8.8	1.35	42.0	1.61	65.4
18	.60	4.8	.59	4.6	.90	13.2	2.65	218.0	1.20	30.2	1.39	45.4
19	.61	5.0	.59	4.6	.86	11.6	1.25	34.0	1.20	30.2	1.35	42.0
20	.59	4.6	.58	4.4	.81	9.8	1.10	23.3	1.22	31.8	1.13	25.3
21	.97	16.4	.57	4.2	.83	10.5	1.25	34.0	1.08	22.2	1.12	24.6
22	.84	10.8	.55	3.9	.82	10.2	1.31	38.7	1.01	18.5	1.16	27.3
23	.58	4.4	.55	3.9	.80	9.5	1.69	74.5	1.00	18.0	3.15	312.0
24	.58	4.4	.55	3.9	.78	8.8	1.21	31.0	1.25	34.0	1.95	106.5
25	.54	3.8	1.65	70.0	.80	9.5	1.10	23.3	1.35	42.0	1.74	80.4
26	.52	3.4	1.35	42.0	.80	9.5	1.04	20.1	1.24	33.2	1.45	50.6
27	.53	3.6	.96	15.9	.78	8.8	1.02	19.0	1.25	34.0	2.20	142.4
28	.51	3.3	.91	13.6	.76	8.3	1.01	18.5	1.98	110.8	1.55	59.8
29	.50	3.2	1.27	35.6	.79	9.1	.96	15.9	1.71	76.1	1.39	45.4
30	.51	3.3	1.43	48.9	.74	7.8	.94	15.0	1.31	38.7	1.35	42.0
31	.51	3.3	3.91	468.0	....	....	.92	14.1	....	....	3.52	387.0

Daily gage height, in feet, of Northwest Branch of Anacostia River at Bladensburg, Md., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.55	1.75	1.65	1.90	1.50	1.47	1.22	1.05	0.92
2	1.72	1.53	1.48	1.78	1.47	1.42	1.18	1.02	.90
3	1.55	1.65	1.40	2.95	1.40	1.38	1.16	1.00	.98
4	1.41	1.63	1.28	1.82	1.37	1.35	1.15	.98	.92
5	1.35	1.65	1.00	1.65	1.35	1.24	1.05	.96	.94
6	1.68	1.75	.94	1.63	1.45	1.25	1.03	.96	.90
7	1.35	1.65	1.75	1.62	[a]6.00	1.46	1.00	.94	.88
8	1.45	1.48	1.80	2.05	3.30	1.35	.98	.94	1.28
9	1.32	1.45	1.89	1.78	2.30	1.14	.95	.96	.98
10	1.39	1.05	1.61	1.65	1.85	1.10	.90	1.15	.92
11	1.35	1.17	1.48	1.59	1.72	1.09	1.15	1.05	.84
12	1.38	1.28	1.76	1.54	2.35	1.07	1.00	1.00	.82
13	1.41	1.31	4.40	1.72	3.00	1.05	.98	1.00	.80
14	1.65	1.28	2.10	1.64	2.32	1.20	.96	.97	.80
15	1.55	1.20	1.55	1.62	1.71	1.38	2.00	.95	.78
16	1.28	1.05	5.05	1.80	3.60	1.20	1.80	.95	2.40
17	1.04	1.08	2.10	1.85	2.40	2.20	1.70	.95	1.30
18	.93	2.45	1.95	1.96	2.05	1.60	1.52	.94	1.10
19	1.55	1.80	1.80	2.05	1.60	1.44	1.40	.90	1.45
20	4.53	1.55	1.55	1.75	1.50	1.44	1.30	1.36	1.20
21	2.71	3.15	1.38	1.61	1.45	1.33	1.05	1.00	1.00
22	1.65	3.65	1.35	1.64	1.40	1.28	1.75	.95	.95
23	1.55	2.80	1.27	1.70	1.40	1.30	1.30	.90	....
24	1.45	1.95	3.28	1.57	1.42	1.38	1.08	.90	....
25	1.30	1.65	2.26	1.50	1.38	1.80	1.75	.86	....
26	1.25	1.78	1.83	1.46	1.31	2.43	1.45	.85	....
27	1.42	5.48	1.68	1.50	1.27	3.50	1.15	.90	....
28	1.51	2.00	1.65	1.49	1.24	1.66	1.00	.86	....
29	1.65	1.72	4.40	1.46	1.30	1.49	1.05	1.05	....
30	2.85	....	3.84	1.57	1.65	1.49	1.37	.95	....
31	2.05	....	2.10	....	1.52	....	1.05	.92	....

[a] Backwater.

Daily discharge, in second-feet, of Northwest Branch of Anacostia River at Bladensburg, Md., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	200.0	81.5	57.5	83.0	44.0	41.5	36.0	24.3	17.0
2	78.0	58.0	42.4	70.4	41.5	37.5	33.0	22.4	16.2
3	60.0	70.0	36.0	220.0	36.0	34.3	31.4	21.2	20.0
4	47.1	68.0	27.0	74.5	33.5	32.0	30.7	20.0	17.0
5	42.0	70.0	11.5	57.7	32.0	24.4	24.3	19.0	18.0
6	73.5	81.5	9.0	55.8	40.0	25.0	23.0	19.0	16.2
7	42.0	70.0	67.5	54.8	366.0	40.7	21.2	18.0	15.4
8	50.7	53.4	72.3	99.8	272.0	32.0	20.0	18.0	40.5
9	39.5	50.7	82.0	70.4	130.3	18.4	18.5	19.0	20.0
10	45.4	20.6	54.0	57.7	77.6	16.2	16.2	30.7	17.0
11	42.0	28.0	42.5	52.1	64.5	15.6	30.7	24.3	13.6
12	44.5	36.3	68.5	47.7	136.8	14.8	21.2	21.2	12.9
13	47.1	38.7	444.0	64.5	227.0	13.7	20.0	21.2	12.3
14	70.0	36.3	105.6	56.8	133.0	22.0	19.0	19.5	12.3
15	60.0	30.2	48.5	54.8	63.5	34.3	120.0	18.5	11.8
16	36.3	20.6	548.0	72.3	318.0	22.0	94.5	18.5	182.0
17	20.1	22.2	105.6	77.6	143.5	149.7	82.6	18.5	42.2
18	14.5	182.0	88.5	89.6	99.8	71.1	63.0	18.0	27.2
19	60.0	87.5	72.3	99.8	53.0	55.0	51.0	16.2	56.0
20	597.0	60.0	48.5	65.3	44.0	55.0	42.2	47.5	34.5
21	228.0	249.0	34.3	53.9	40.0	44.7	24.3	21.2	21.2
22	70.0	325.0	32.0	56.8	36.0	40.5	88.5	18.5	18.5
23	60.0	198.0	26.5	62.5	36.0	42.2	42.2	16.2	....
24	50.7	88.5	267.0	50.5	37.5	49.5	26.0	16.2	....
25	37.9	57.5	125.2	44.0	34.3	94.6	88.5	14.6	....
26	33.9	70.4	75.5	40.7	29.5	187.0	56.0	14.0	....
27	48.0	617.0	60.6	44.0	26.5	310.0	30.7	16.2	....
28	56.1	94.0	57.8	43.2	24.3	78.0	21.2	14.6	....
29	70.0	64.5	444.0	40.7	28.5	60.0	24.3	24.3	....
30	255.0	....	356.0	50.5	57.5	60.0	48.5	18.5	....
31	120.5	....	105.6	....	45.9	....	24.3	17.0	....

Monthly discharge of Northwest Branch of Anacostia River at Bladensburg, Md., for 1911–12.

[Drainage area, 52 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1911.					
July	16.4	3.2	5.25	0.10	0.12
August	468.0	3.0	30.15	.58	.67
September	473.0	5.8	41.50	.80	.89
October	218.0	6.0	23.23	.45	.51
November	110.8	9.8	39.22	.75	.84
December	387.0	12.8	58.76	1.13	1.30
1912.					
January	597.0	14.5	87.1	1.68	1.94
February	617.0	20.6	101	1.94	2.09
March	548.0	9.0	117	2.25	2.59
April	220.0	40.7	67.0	1.29	1.44
May	366.0	24.3	88.8	1.71	1.97
June	310.0	13.7	57.4	1.10	1.23
July	120.0	16.2	41.1	.790	.91
August	47.5	14.0	20.2	.388	.45
September 1-22	182.0	11.8	29.2	.562	.46

BEAVERDAM BRANCH OF ANACOSTIA RIVER AT KENILWORTH, D. C.

Location.—Just below stone culvert under Kenilworth Avenue and about 500 feet north of the District line at Kenilworth.

Records available.—July 1, 1911, to September 21, 1912.

Drainage area.—14 square miles.

Gage.—Vertical staff attached to a steel frame about 50 feet below culvert. Zero of gage is at elevation 3.68 feet above United States Engineer Department mean low water.

Channel.—Sand and gravel.

Discharge measurements.—Made by wading.

Cooperation.—Established, maintained, and records furnished by United States Engineer Office.

Daily gage height, in feet, and discharge, in second-feet, of Beaverdam Branch of Anacostia River at Kenilworth, D. C., for 1911.

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.90	1.8	0.90	1.8	0.93	2.5	0.93	2.5	0.99	4.0	1.19	12.1
2	.90	1.8	.93	2.5	.95	3.0	.95	3.0	1.01	4.8	1.14	9.7
3	.90	1.8	.94	2.7	.90	1.8	.95	3.0	1.02	5.3	1.12	8.7
4	.90	1.8	.99	4.0	.89	1.5	.95	3.0	1.02	5.3	1.10	8.0
5	.90	1.8	.99	4.0	.91	2.0	.97	3.5	1.02	5.3	1.10	8.0
6	.90	1.8	.98	3.8	.87	1.1	.99	4.0	1.03	5.5	1.09	7.6
7	.90	1.8	.96	3.3	.90	1.8	1.00	4.4	1.25	15.2	1.09	7.6
8	.90	1.8	.93	2.5	.87	1.1	.95	3.0	1.12	8.7	1.07	6.8
9	.90	1.8	.92	2.3	.91	2.0	.95	3.0	1.07	6.8	1.04	5.7
10	.90	1.8	.91	2.0	.90	1.8	.93	2.5	1.08	7.2	1.04	5.7
11	.90	1.8	.90	1.8	.93	2.5	.95	5.0	1.05	6.0	1.03	5.5
12	.90	1.8	.88	1.3	.93	2.5	.94	2.7	1.08	7.2	1.04	5.7
13	.90	1.8	.87	1.1	.89	1.5	.93	2.5	1.23	14.2	1.03	5.5
14	.90	1.8	.87	1.1	.88	1.3	.93	2.5	1.03	5.5	1.03	5.5
15	.90	1.8	.88	1.3	1.67	41.6	.94	2.7	1.54	32.5	1.48	28.7

Daily gage height, in feet, and discharge, in second-feet, of Beaverdam Branch of Anacostia River at Kenilworth, D. C., for 1911—Continued.

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
16	0.88	1.3	0.89	1.5	1.01	4.8	0.94	2.7	1.34	20.3	1.49	29.0
17	.94	2.7	.88	1.3	1.00	4.4	.95	3.0	1.13	9.2	1.49	29.0
18	.91	2.0	.91	2.0	.95	3.0	1.74	48.0	1.86	60.4	1.27	16.3
19	.87	1.1	.87	1.1	.95	3.0	1.20	12.7	1.35	20.8	1.19	12.1
20	.92	2.3	.90	1.8	.95	3.0	1.07	6.8	1.19	12.1	1.12	8.7
21	.94	2.7	.90	1.8	.93	2.5	1.14	9.7	1.13	9.2	1.13	9.2
22	.99	4.0	.90	1.8	.92	2.3	1.15	10.1	1.10	8.0	1.25	15.2
23	.94	2.7	.84	.5	.90	1.8	1.36	21.4	1.08	7.2	1.76	50.0
24	.90	1.8	.88	1.3	.93	2.5	1.14	9.7	1.53	31.8	1.48	28.7
25	.90	1.8	.88	1.3	.91	2.0	1.06	6.4	1.42	25.0	1.42	25.0
26	.90	1.8	.93	2.5	.92	2.3	1.05	6.0	1.22	13.7	1.48	28.7
27	.90	1.8	.93	2.5	.91	2.0	1.02	5.3	1.16	10.6	1.74	48.2
28	.89	1.5	.91	2.0	.93	2.5	1.01	4.8	1.46	27.4	1.38	22.8
29	.88	1.3	.89	1.5	.94	2.7	1.02	5.3	1.49	29.0	1.23	14.2
30	.88	1.3	1.05	6.0	.94	2.7	1.02	5.3	1.27	16.3	1.20	12.7
31	.88	1.3	1.07	6.8	....	....	1.01	4.8	....	....	2.12	95.0

Daily gage height, in feet, of Beaverdam Branch of Anacostia River at Kenilworth, D. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.52	1.60	1.21	1.47	1.21	1.02	1.05	0.89	0.73
2	1.31	1.29	1.18	1.48	1.20	1.01	1.03	.90	.74
3	1.28	1.45	1.12	1.60	1.19	1.03	1.01	.94	.80
4	1.25	1.20	1.05	1.44	1.15	1.03	1.00	.83	.80
5	1.25	1.20	1.05	1.39	1.13	1.00	1.00	.83	.80
6	1.25	1.10	1.09	1.36	1.19	1.80	1.00	.83	.75
7	1.25	1.05	1.30	1.37	[a] 2.30	1.17	1.00	.82	.75
8	1.25	1.05	1.20	1.53	1.88	1.04	1.00	.82	.80
9	1.25	1.05	1.34	1.39	1.53	1.03	.98	.82	.75
10	1.25	1.05	1.16	1.34	1.32	1.00	1.00	.83	.74
11	1.25	1.05	1.03	1.30	1.15	1.00	1.03	.82	.73
12	1.25	1.05	1.75	1.31	1.67	.99	1.01	.81	.71
13	1.25	1.05	2.48	1.30	1.53	.99	.96	.78	.70
14	1.30	1.06	1.72	1.31	1.39	.98	.95	.79	.71
15	1.30	1.06	3.96	1.30	1.30	1.02	1.52	.77	.73
16	1.30	1.09	2.23	1.28	1.95	1.03	1.08	.77	.73
17	1.30	1.12	1.85	1.30	1.73	1.20	1.00	.75	.73
18	1.30	2.11	1.77	1.49	1.35	1.12	3.42	.75	.84
19	2.02	1.76	1.62	1.42	1.24	1.08	1.60	.95	1.27
20	1.66	1.63	1.55	1.34	1.21	1.05	1.13	.92	.94
21	1.40	1.60	1.52	1.29	1.17	1.04	1.01	.82	.82
22	1.20	2.30	1.48	1.28	1.10	1.00	1.06	.75	....
23	1.22	1.42	1.41	1.35	1.12	1.02	.97	.75	....
24	1.23	1.21	2.40	1.24	1.11	1.01	.94	.73	....
25	1.25	1.24	1.80	1.23	1.05	1.25	.95	.73	....
26	1.12	1.49	1.55	1.20	1.05	1.50	1.00	.74	....
27	1.20	2.50	1.47	1.20	1.05	1.47	.93	.75	....
28	1.20	1.48	1.43	1.22	1.05	1.24	.90	.72	....
29	1.35	1.26	2.54	1.21	1.12	1.13	.90	.80	....
30	1.85	....	1.88	1.22	1.07	1.09	.90	.76	....
31	1.65	....	1.56	....	1.04	....	.80	.75	....

[a] Backwater.

Daily discharge, in second-feet, of Beaverdam Branch of Anacostia River at Kenilworth, D. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	31.2	36.3	8.3	21.7	8.2	1.2	5.2	1.6	0.8
2	18.7	17.5	6.9	22.2	7.8	1.0	4.5	1.7	.9
3	16.8	26.8	4.5	29.7	7.3	1.5	4.0	2.0	1.4
4	15.2	12.7	2.1	20.0	5.7	1.5	3.7	1.5	1.4
5	15.2	12.7	2.1	17.2	4.8	.6	3.7	1.5	1.4
6	15.2	8.0	3.4	15.7	7.3	45.5	3.7	1.5	1.0
7	15.2	6.0	12.7	16.2	76.0	6.5	3.7	1.5	1.0
8	15.2	6.0	7.8	25.1	53.0	1.8	3.7	1.5	1.4
9	15.2	6.0	14.6	17.2	25.1	1.5	3.0	1.5	1.0
10	15.2	6.0	6.0	14.7	13.6	.6	3.7	1.5	.9
11	15.2	6.0	1.5	12.6	5.7	.6	4.5	1.5	.8
12	15.2	6.0	39.0	13.1	34.7	.4	4.0	1.4	.6
13	15.2	6.0	87.6	12.6	25.1	.4	2.5	1.2	.5
14	18.1	6.4	37.1	13.1	17.2	.2	2.2	1.3	.6
15	18.1	6.4	187.0	12.6	12.6	1.2	29.7	1.1	.8
16	18.1	7.6	71.0	11.6	60.1	4.5	6.3	1.1	.5
17	18.1	8.7	45.8	12.6	39.5	11.5	3.7	1.0	.8
18	18.1	70.2	40.5	22.7	15.2	7.9	440.0	1.0	1.5
19	64.1	46.7	30.6	18.9	9.6	6.3	34.4	2.2	14.2
20	40.1	38.1	26.5	14.7	8.2	5.2	8.4	1.8	2.0
21	23.8	29.4	24.7	12.1	6.5	4.9	4.0	1.5	1.5
22	12.7	75.8	22.2	11.6	3.7	3.7	5.6	1.0	....
23	13.7	19.0	18.5	15.2	4.5	4.2	2.6	1.0	....
24	14.2	8.3	82.5	9.6	4.2	4.0	2.0	.8	....
25	15.2	9.7	42.5	9.1	2.2	14.0	2.2	.8	....
26	8.7	22.8	26.5	7.8	2.2	28.5	3.7	.9	....
27	12.7	89.0	21.6	7.8	2.2	26.5	1.8	1.0	....
28	12.2	22.3	19.5	8.7	2.2	13.4	1.3	.7	....
29	20.8	10.7	94.7	8.2	4.6	8.4	1.3	1.4	....
30	53.0	....	47.9	8.7	2.7	6.6	1.3	1.0	....
31	39.4	....	27.0	....	1.8	....	.5	1.0	....

Monthly discharge of Beaverdam Branch of Anacostia River at Kenilworth, D. C., for 1911–12.

[Drainage area, 14 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1911.					
July	4.0	1.1	1.88	0.13	0.15
August	6.8	.5	2.30	.16	.19
September	41.6	1.1	3.68	.26	.29
October	48.0	2.5	6.69	.48	.55
November	60.4	4.0	14.49	1.04	1.15
December	95.0	5.5	18.56	1.33	1.53
1912.					
January	64.1	8.7	20.7	1.48	1.71
February	89.0	6.0	21.6	1.54	1.66
March	187.0	1.5	34.3	2.45	2.82
April	29.7	7.8	14.8	1.06	1.18
May	76.0	1.8	15.3	1.09	1.26
June	45.5	.2	7.14	.510	.57
July	440.0	.5	19.4	1.39	1.60
August	2.2	.7	1.31	.094	.11
September 1-21	14.2	.5	1.68	.120	.09

RAPPAHANNOCK RIVER BASIN.

RAPPAHANNOCK RIVER NEAR FREDERICKSBURG, VA.

Location.—About 3½ miles above Fredericksburg, and about 1½ miles above the dam of the Fredericksburg Power Co.

Records available.—September 19, 1907, to December 31, 1912.

Drainage area.—1,590 square miles.

Gage.—Original gage and station located at a pool a few hundred feet above a rocky control. This gage was destroyed February 14, 1908, and was replaced February 20, 1908, by a chain gage under the cable. Datum for both gages the same and unchanged.

Channel.—Probably permanent. Current sluggish at extreme low water.

Discharge measurements.—Made from car and cable.

Winter flow.—Not often affected by ice.

Accuracy.—Accurate discharge measurements at low stages are difficult. A good low-water rating curve has been developed.

Cooperation.—Established in cooperation with the Fredericksburg Power Co., by which the cable and equipment were furnished.

The following discharge measurement was made by J. G. Mathers:

May 13, 1912: Gage height, 4.97 feet; discharge, 26,700 second-feet.

Daily gage height, in feet, of Rappahannock River near Fredericksbury, Va., for 1912.

[J. W. Franklin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	2.4	3.0	3.5	1.95	2.0	1.65	2.6	1.02	2.15	1.44	1.45
2	2.35	2.2	2.8	3.2	1.9	1.9	1.65	2.1	.97	2.05	1.44	1.44
3	2.2	2.25	2.5	3.7	1.85	1.85	1.7	1.55	1.24	1.95	1.43	1.48
4	2.25	2.2	2.35	3.1	1.75	1.75	1.55	1.40	1.42	1.85	1.39	1.5
5	2.2	1.85	2.35	2.7	1.75	1 75	1.38	1.28	1.20	1.75	1.40	1.49
6	1.75	1.75	2.2	2.6	1.75	1.7	1.32	1.18	1.10	1.75	1.39	1.75
7	2.2	1.8	2.2	2.6	1.85	2.25	1.28	1.10	1.16	1.65	1.55	1.9
8	2.25	1.8	2.8	2.5	3.8	2.05	1.25	1.07	3.0	1.65	5.4	1.85
9	2.25	1.8	3.0	2.35	3.9	1.85	1.23	1.05	2.3	1.55	3.4	1.6
10	2.1	1.7	2.9	2.25	2.6	1.65	1.18	2.2	1.7	1.5	2.8	1.55
11	2.0	1.65	2.6	2.2	2.25	1.55	1.11	2.6	1.26	1.48	2.3	1.48
12	2.05	1.65	2.8	2.15	3.5	1.5	1.30	2.2	1.12	1.47	2.15	1.5
13	2.06	1.65	6.9	2.1	9.0	1.45	1.65	1.75	1.01	1.44	2.05	1.48
14	2.2	1.6	4.2	2.15	5.8	1.45	1.55	1.6	.95	1.44	2.0	1.40
15	2.2	1.6	6.1	2.2	3.6	1.49	4.5	1.7	.94	1.55	1.96	1.40
16	2.2	1.65	7.7	2.15	5.3	1.43	3.2	1.5	.93	1.55	1.85	1.43
17	2.2	1.7	5.5	2.35	6.4	1.65	1.7	1.38	.90	1.49	1.75	1.43
18	2.05	1.7	4.0	2.35	4.2	2.25	1.30	1.30	.90	1.41	1.7	1.45
19	2.25	1.95	3.3	2.3	3.6	1.85	3.2	1.25	1.26	1.33	1.65	1.65
20	2.8	2.1	3.0	2.2	3.2	1.75	2.15	1.28	1.38	1.41	1.65	2.0
21	2.5	2.25	2.9	2.15	2.9	1.7	1.85	1.30	1.49	1.40	1.65	1.75
22	2.4	5.5	2.8	2.1	2.7	1.6	1.7	1.25	1.5	1.41	1.65	1.56
23	2.4	3.6	2.6	2.15	2.6	1.65	1.55	1.19	1.7	1.43	1.6	1.5
24	2.3	2.7	2.8	2.1	2.4	1.5	1.34	1.10	6.2	2.45	1.55	1.46
25	2.4	2.6	3.4	1.95	2.4	1.55	1.55	1.05	9.8	2.0	1.55	1.42
26	2.25	2.8	3.0	1.9	2.25	2.0	1.9	1.00	5.7	1.7	1.55	1.43
27	2.0	6.8	2.7	1.9	2.15	2.25	1.75	1.08	3.4	1.6	1.5	1.75
28	2.05	4.1	2.6	1.9	2.1	2.8	1.40	1.04	3.1	1.49	1.55	2.8
29	2.1	3.2	6.9	1.95	2.05	2.4	1.30	1.09	2.8	1.44	1.47	2.35
30	2.25	....	5.9	1.9	2.05	1.95	1.43	1.10	2.45	1.45	1.47	2.35
31	2.4	....	4.3	....	2.15	....	1.48	1.07	....	1.43	....	5.5

NOTE.—River partly frozen over at the gage, but it is believed that the relation of gage height to discharge was not seriously affected by the ice.

Daily discharge, in second-feet, of Rappahannock River near Fredericksburg, Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,400	1,920	2,920	3,920	1,280	1,350	918	2,240	342	1,560	687	698
2	1,840	1,620	2,570	3,290	1,220	1,220	918	1,480	311	1,420	687	687
3	1,620	1,700	2,080	4,370	1,160	1,160	975	805	502	1,280	676	729
4	1,700	1,620	1,840	3,100	1,040	1,040	805	645	666	1,160	636	750
5	1,620	1,160	1,840	2,400	1,040	1,040	626	534	470	1,040	645	740
6	1,040	1,040	1,620	2,240	1,040	975	569	455	395	1,040	636	1,040
7	1,620	1,100	1,620	2,240	1,160	1,700	534	395	440	918	805	1,220
8	1,700	1,100	2,570	2,080	4,610	1,420	510	375	2,920	918	9,390	1,160
9	1,700	1,100	2,920	1,840	4,850	1,160	494	362	1,770	805	3,700	860
10	1,480	975	2,740	1,700	2,240	918	456	1,620	975	750	2,570	805
11	1,350	918	2,240	1,620	1,700	805	402	2,240	518	729	1,770	729
12	1,420	918	2,570	1,560	3,920	750	550	1,620	410	718	1,560	750
13	1,420	918	15,400	1,480	25,700	698	918	1,040	336	687	1,420	729
14	1,620	860	5,630	1,560	10,900	698	805	860	300	687	1,350	645
15	1,620	860	12,000	1,620	4,140	740	6,480	975	294	805	1,280	645
16	1,620	918	19,100	1,560	9,030	676	3,290	750	288	805	1,160	676
17	1,620	975	9,760	1,840	13,300	918	975	626	270	740	1,040	676
18	1,420	975	5,100	1,840	5,630	1,700	550	550	270	656	975	698
19	1,700	1,280	3,490	1,770	4,140	1,160	3,290	510	518	578	918	918
20	2,570	1,480	2,920	1,620	3,290	1,040	1,560	534	626	656	918	1,350
21	2,080	1,700	2,740	1,560	2,740	975	1,160	550	740	645	918	1,040
22	1,920	9,760	2,570	1,480	2,400	860	975	510	750	656	918	805
23	1,920	4,140	2,240	1,560	2,240	918	805	462	975	676	860	750
24	1,770	2,400	2,570	1,480	1,920	750	588	395	12,400	2,000	805	708
25	1,920	2,240	3,700	1,280	1,920	805	805	362	29,800	1,350	805	666
26	1,700	2,570	2,920	1,220	1,700	1,350	1,220	329	10,500	975	805	676
27	1,350	15,000	2,400	1,220	1,560	1,700	1,040	382	3,700	860	750	1,040
28	1,420	5,360	2,240	1,220	1,480	2,570	645	355	3,100	740	805	2,570
29	1,480	3,290	15,400	1,280	1,420	1,920	550	388	2,570	687	718	1,840
30	1,700	....	11,300	1,220	1,420	1,280	676	395	2,000	698	718	1,840
31	1,920	....	5,910	....	1,560	....	729	375	....	676	....	9,760

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Rappahannock River near Fredericksburg, Va., for 1912.

[Drainage area, 1,590 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,570	1,040	1,690	1.06	1.22	B.
February	15,000	860	2,410	1.52	1.64	A.
March	19,100	1,620	5,000	3.14	3.62	A.
April	4,370	1,220	1,910	1.20	1.34	A.
May	25,700	1,040	3,930	2.47	2.85	A.
June	2,570	676	1,140	.717	.80	A.
July	6,480	402	1,120	.704	.81	A.
August	2,240	329	746	.469	.54	A.
September	29,800	270	2,640	1.66	1.85	A.
October	2,000	578	900	.566	.65	A.
November	9,390	636	1,360	.855	.95	A.
December	9,760	645	1,230	.774	.89	A.
The year	29,800	270	2,010	1.26	17.16	

MISCELLANEOUS MEASUREMENTS.

Miscellaneous measurements in north Atlantic coast drainage basins in 1912.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Feb. 14[a]	Millers River	Connecticut River,	Wendell, Mass	2.69	4.38
Nov. 22	do	do	do	1.90	1.76
Mar. 11	Indian River	Hudson River	Highway bridge below dam near Indian Lake, N. Y.	[b]8.27	522
12	Big Brook	Indian River	One mile above mouth, near Indian Lake, N. Y.		10.0
Oct. 18	Hudson River	Atlantic Ocean	Mechanicville, N. Y		[c]3,700

[a] Complete ice cover below gage.

[b] Distance reference point to water surface. Reference point is cross on top of lower chord eyebar, second panel from right end of bridge, and 2 feet from right end of bar. Gage at Indian Lake dam read 14.45 feet. Discharge from Big Brook was 10 second-feet; discharge from other sources, including leakage through dam, was 5 second-feet. Therefore discharge through gates at dam was 507 second-feet. Gate A was open 5 feet and gate B 3 feet.

[c] Made in the tail race of the Adirondack Electric Power Corporation near Mechanicville and includes only the flow through the wheels of that plant.

SUMMARY OF DISCHARGE PER SQUARE MILE.

The following summary of discharge per square mile is given to allow ready comparison of relative rates of run-off from different areas in the north Atlantic coast drainage basins. It shows in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage; but the most important fact worth noting is the almost entire lack of uniformity or agreement between any two streams. This indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, for stations in north Atlantic coast drainage basins for 1912.

Station.	Drainage area.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
	Sq.mi.													
St. John River at Fort Kent, Me	4,880	0.29	0.18	0.33	3.38	8.18	4.71	0.46	1.96	0.65	1.55	3.03	1.13	2.15
St. John River at Van Buren, Me	8,270	....	....	....	....	....	5.39	.93	1.89	.80	1.44	3.08	2.20	....
Machias River at Whitneyville, Me	465	1.58	1.65	3.85	4.17	3.74	3.96	.69	.87	.70	2.22	3.35	2.43	2.43
Union River at Amherst, Me	140	2.86	1.57	4.64	6.19	3.41	3.20	.46	.56	.49	1.43	3.82	3.33	2.66
Green Lake Stream at Lakewood, Me	47	.43	.64	2.55	5.60	3.47	3.40	1.38	1.30	2.49	1.69	.49	1.07	2.04
West Branch of Penobscot River at Millinocket, Me	1,880	1.10	1.09	1.08	1.22	3.53	4.00	1.81	1.27	1.18	1.19	3.37	1.74	1.88
Penobscot River at West Enfield, Me	6,600	1.27	1.03	1.82	4.98	4.02	3.80	1.16	1.70	1.01	1.94	3.86	1.71	2.35
East Branch of Penobscot River at Grindstone, Me	1,100	.68	.44	.91	4.64	4.67	4.88	1.60	1.87	1.04	2.30	3.90	1.60	2.37
Mattawamkeag River at Mattawamkeag, Me	1,500	1.41	.93	1.53	5.52	4.07	4.69	.50	2.20	.79	1.89	4.87	1.76	2.51
Piscataquis River at Foxcroft, Me	286	1.57	1.12	2.27	9.16	6.40	2.79	.43	1.28	.48	3.36	4.34	1.75	2.91
Kenduskeag Stream near Bangor, Me	191	1.31	.78	2.09	6.60	2.38	2.58	.32	.55	.47	2.69	4.47	3.01	2.27
Moose River at Rockwood, Me	680	.83	.52	.61	3.12	5.74	4.26	1.02	.89	....	....	....	....	....
Kennebec River at The Forks, Me	1,570	.48	.89	.76	1.57	5.43	3.18	1.76	1.36	1.03	.91	.97	1.17	1.63
Kennebec River at Waterville, Me	4,270	.71	.70	1.11	5.04	4.78	2.86	.80	1.07	.83	1.34	1.72	1.11	1.85
Dead River at The Forks, Me	878	.54	.31	.74	4.97	6.67	2.32	.40	1.46	.92	1.40	1.79	1.30	1.90
Sandy River near Farmington, Me	270	.63	.48	1.11	7.00	4.93	1.60	.22	.67	.39	2.30	2.54	3.36	2.10
Sebasticook River at Pittsfield, Me	320	1.35	.97	2.22	7.75	2.26	2.53	.63	.81	.77	1.03	3.25	1.49	2.08
Cobbosseecontee Stream at Gardiner, Me	220	.72	.88	1.73	3.46	1.41	2.13	.97	1.02	.84	.79	.96	.96	1.32
Androscoggin River at Errol Dam, N. H	1,095	1.51	1.63	1.43	1.47	1.99	3.03	1.53	1.31	1.37	1.29	1.32	1.32	1.60

Summary of discharge, in second-feet per square mile, for stations in north Atlantic coast drainage basins for 1912—Continued.

Station.	Drainage area.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
	Sq.mi.													
Androscoggin River at Rumford Falls, Me	2,090	1.11	1.10	1.23	3.71	2.62	2.14	.95	1.08	1.13	1.46	1.51	**1.34**	**1.61**
Presumpscot River at outlet Sebago Lake, Me	436	1.14	1.12	.82	.79	1.08	1.08	1.13	1.32	1.38	1.40	1.38	**1.56**	**1.18**
Saco River at West Buxton, Me	1,550	.89	.72	1.94	6.27	3.95	2.23	.79	.90	.72	1.00	1.90	**1.18**	**1.87**
Middle Branch of Pemigewasset River at North Woodstock, N. H	28.6	1.16	.70	....	10.2	10.2	3.64	.76	2.50	2.59	3.89	....	....	....
Pemigewasset River at Plymouth, N. H	615	1.74	.50	2.29	9.48	4.91	2.02	.52	1.34	1.04	2.70	3.20	**2.26**	**2.67**
Merrimac River at Franklin Junction, N. H	1,460	1.23	1.27	2.40	5.53	3.26	1.86	.78	1.40	1.21	2.12	2.51	**1.78**	**2.11**
Merrimac River at Garvins Falls, N. H.	2,340	1.16	1.21	2.51	5.25	2.92	1.68	.62	.75	1.08	.98	.94	**.79**	**1.66**
Merrimac River at Lawrence, Mass	4,452	.80	.71	2.77	4.32	2.30	1.30	.41	.50	.48	.73	1.24	**1.07**	**1.39**
Souhegan River at Merrimac, N. H	168	....	....	5.77	5.39	2.73	.83	.28	.30	.28	.37	1.64	**1.78**	....
Connecticut River at Orford, N. H	3,300	.94	.43	1.16	6.61	3.27	2.90	.42	.67	1.24	1.18	1.71	**1.65**	**1.84**
Connecticut River at Sunderland, Mass.	7,700	1.17	.65	1.43	6.90	3.19	2.45	.42	.54	.99	1.68	2.06	**1.79**	**1.94**
Passumpsic River near St. Johnsbury, Vt	390	....	....	....	4.18	2.03	1.43	.29	.37	.77	.82	1.15	**1.02**	....
Deerfield River at Shelburne Falls, Mass.	501	.73	.62	3.68	8.00	3.55	1.88	.31	.49	.50	2.89	3.30	**2.84**	**2.40**
Ware River at Gibbs Crossing, Mass	201	....	....	....	....	....	....	....	....	.21	.24	.52	**.84**	....
Swift River at West Ware, Mass	191	....	....	....	....	....	....	....	....	....	.28	.56	**.70**	....
Quaboag River at West Brimfield, Mass.	150	....	....	....	....	....	....	....	....	.29	.25	.47	**.75**	....
Westfield River at Knightville, Mass	162	....	....	....	6.30	2.60	1.09	.16	.26	.27	1.19	2.44	**2.35**	....
Middle Branch of Westfield River at Goss Heights, Mass	53	....	....	....	6.62	3.30	.85	....	....	.41	....	....	**3.17**	....
Hudson River at North Creek, N. Y	804	1.00	1.32	1.02	7.28	4.73	1.42	.85	1.13	1.11	1.58	2.28	**1.52**	**2.10**
Hudson River at Thurman, N. Y	1,550	1.10	.97	.84	6.37	4.11	1.44	.58	.75	.79	1.16	1.94	**1.35**	**1.77**
Hudson River at Corinth, N. Y	2,760	1.21	.92	1.76	8.48	4.31	1.26	.44	.51	.66	1.45	2.68	**1.63**	**2.11**
Hudson River at Spier Falls, N. Y	2,800	....	....	....	....	....	....	....	....	....	....	2.24	**1.75**	....
Hudson River at Mechanicville, N. Y	4,500	1.06	.76	2.22	6.13	2.87	1.23	.29	.28	.55	1.54	2.40	**1.92**	**1.77**
Cedar River near Indian Lake, N. Y	......	....	....	....	....	8.20	1.60	.60	.52	1.34	2.22	3.42	....	....
Indian River near Indian Lake, N. Y	......	....	....	....	....	....	....	3.74	4.97	2.31	.65	.01	**.03**	....
Schroon River at Riverbank, N. Y	534	1.35	.65	.68	7.19	3.99	1.66	.28	.36	.46	.73	2.15	**1.50**	**1.74**
Sacandaga River near Hope, N. Y	494	1.21	.61	1.82	10.1	4.43	.99	.22	.18	.52	1.51	2.87	**2.47**	**2.25**
Sacandaga River at Hadley, N. Y	1,060	1.01	.62	2.01	8.59	3.50	.92	.20	.18	.54	1.48	2.55	**2.23**	**1.98**
West Branch of Sacandaga River at Blackbridge near Wells, N. Y	211	1.18	.62	1.90	11.6	5.55	1.58	.19	.18	.75	1.94	3.62	**3.17**	**2.68**
Hoosic River near Eagle Bridge, N. Y	512	1.11	.90	2.95	5.41	2.75	1.88	.42	.34	.41	1.43	1.84	**2.07**	**1.79**
West Canada Creek at Wilmurt, N. Y	198	2.51	2.26	4.86	....	....	2.22	.37	1.24	4.76	7.01	....	....	....
West Canada Creek at Kast Bridge, N. Y.	575	1.74	2.71	....	1.17	4.21	1.10	.52	.57	1.56	2.42	3.36	**3.26**	....
East Canada Creek at Dolgeville, N. Y	256	1.09	.86	1.98	11.5	3.25	.92	.40	.43	1.07	2.08	....	....	....
Schoharie Creek at Prattsville, N. Y	240	1.12	2.15	5.88	6.55	2.47	.57	.18	.39	.35	1.31	1.57	**2.48**	**2.08**
Kinderhook Creek at Rossman, N. Y	331	....	....	....	5.17	2.11	1.15	....	....	....	....	1.55	**1.80**	....
Esopus Creek near Olivebridge, N. Y	239	1.37	1.92	6.25	7.27	3.43	.79	.32	.97	.65	1.47	2.41	**2.95**	**2.49**
Esopus Creek at Mount Marion, N. Y	378	1.31	1.90	6.24	6.31	3.12	.81	.25	.68	.51	1.38	2.42	**2.70**	**2.30**
Rondout Creek at Rosendale, N. Y	380	2.68	2.93	6.03	4.87	2.81	.80	.22	.60	.36	1.04	1.67	**2.28**	**2.19**
East Branch of Delaware River at Hancock, N. Y	840	1.48	1.20	5.55	7.71	2.37	.62	.34	.85	.74	1.37	1.98	**2.96**	**2.26**
Delaware River at Port Jervis, N. Y	3,250	.91	1.42	4.03	5.60	2.15	.59	.21	.46	.68	1.24	1.49	**2.03**	**1.74**
Delaware River at Riegelsville, N. J	6,430	1.07	1.10	4.49	4.65	2.40	.80	.41	.60	.84	1.24	1.57	**1.85**	**1.76**
West Branch of Delaware River at Hancock, N. Y	660	.79	.80	5.45	6.50	1.36	.41	.09	.31	.62	1.10	1.68	**2.03**	**1.76**
Mongaup River at Rio, N. Y	189	....	....	1.56	4.52	2.56	1.09	.38	.77	.85	1.36	1.49	**2.17**	....
Lehigh River at South Bethlehem, Pa	1,235	1.29	1.55	4.37	3.55	2.31	.81	.46	.56	1.07	1.38	1.78	**1.89**	**1.76**
Tohickon Creek at Point Pleasant, Pa	102	1.92	3.65	6.92	1.70	1.16	.11	.06	.37	1.20	2.06	2.45	**3.[illegible]**	**2.05**
Neshaminy Creek below forks, Pa	139	1.58	3.43	5.46	1.78	.94	.19	.14	.64	.84	2.12	1.82	**2.50**	**1.78**
Schuylkill River near Philadelphia, Pa	1,920	.98	1.83	4.07	1.89	1.23	.33	.32	.65	.77	.78	1.01	**1.34**	**1.27**
Perkiomen Creek near Frederick, Pa	152	1.75	3.25	5.77	1.62	1.68	.46	.39	.77	1.78	1.26	1.62	**2.38**	**1.89**
Susquehanna River at Binghamton, N. Y	2,400	1.19	1.39	4.15	6.12	1.40	.49	.20	.29	.97	1.24	1.84	**2.12**	**1.78**
Susquehanna River at Wilkes-Barre, Pa.	9,810	.69	.83	3.35	4.77	1.67	.37	.13	.19	1.31	.95	1.34	**1.59**	**1.43**
Susquehanna River at Danville, Pa	11,100	.70	.97	3.47	4.83	1.91	.46	.19	.28	1.39	1.05	1.46	**1.77**	**1.54**
Susquehanna River at Harrisburg, Pa	24,000	.87	1.07	3.70	4.25	2.52	.56	.39	.41	1.27	1.00	1.34	**1.39**	**1.56**
Chemung River near Chemung, N. Y	2,440	.29	.62	3.34	3.66	1.57	.29	.11	.12	.90	.53	.69	**.86**	**1.08**
West Branch of Susquehanna River at Williamsport, Pa	5,640	1.09	.93	4.86	4.43	3.07	.44	.19	.32	1.61	1.20	1.34	**1.05**	**1.71**
Juniata River at Newport, Pa	3,480	.81	1.25	3.88	2.66	3.05	.80	.85	.54	.92	.65	.88	**.68**	**1.42**
Patuxent River near Burtonsville, Md	127	1.81	3.01	3.18	1.27	1.40	....	....	....	....	....	....	....	....
Potomac River at Point of Rocks, Md	9,650	.98	1.70	2.97	1.54	2.05	.55	.89	.36	.66	.32	.34	**.35**	**1.06**
Monocacy River near Frederick, Md	660	1.53	3.38	6.17	2.29	1.40	.77	1.00	.87	2.35	.69	.68	**1.61**	**1.89**
Goose River near Leesburg, Va	338	1.38	1.46	2.51	1.78	2.54	1.90	.86	.98	2.21	.75	.43	**.90**	**1.47**
Northeast Branch of Anacostia River at Hyattsville, Md	75	2.25	2.20	2.92	1.43	2.72	1.28	.64	.22	....	....	....	....	....
Northwest Branch of Anacostia River at Bladensburg, Md	52	1.68	1.94	2.25	1.29	1.71	1.10	.79	.39	....	....	....	....	....
Beaverdam Branch of Anacostia River at Kenilworth, D. C	14	1.48	1.54	2.45	1.06	1.09	.51	1.39	.09	....	....	....	....	....
Rappahannock River at Fredericksburg, Va	1,590	1.06	1.52	3.14	1.20	2.47	.72	.70	.47	1.66	.57	.86	**.77**	**1.26**

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SURFACE WATER SUPPLY OF THE UNITED STATES

1912

PART II. SOUTH ATLANTIC COAST AND EASTERN GULF OF MEXICO BASINS

BY

W. E. HALL AND C. H. PIERCE

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SURFACE WATER SUPPLY OF THE SOUTH ATLANTIC COAST AND EASTERN GULF OF MEXICO BASINS, 1912.

By W. E. HALL and C. H. PIERCE.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of twelve reports presenting results of measurements of flow made on streams in the United States during the calendar year 1912.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394) which contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected, and of the second kind on page 14.

Measurements of stream flow have been made at about 2,000 points in the United States and also at many points in small areas in Seward

Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1912 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular water supply papers from time to time.

PUBLICATIONS.

A report has been prepared for each calendar year embodying the steam-flow data collected during that year. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119. Circulars are also available giving complete lists of the gaging stations maintained by the Survey to date, and a list of the reports relating to the water supply of the country.

Prior to 1902 gage heights and discharge measurements were published in water-supply papers or bulletins and estimates of monthly discharge in annual reports; since 1902 both classes of data have been published in water-supply papers and they are now being published in twelve parts, as shown in the following table:

Papers on surface water supply of the United States, 1912.

Part.[a]	No.	Title.
I	321	North Atlantic coast basins.
II	322	South Atlantic coast and eastern Gulf of Mexico basins.
III	323	Ohio River basin.
IV	324	St. Lawrence River basin.
V	325	Upper Mississippi River and Hudson Bay basins.
VI	326	Missouri River basin.
VII	327	Lower Mississippi River basin.
VIII	328	Western Gulf of Mexico basins.
IX	329	Colorado River basin.
X	330	Great Basin.
XI	331	Pacific coast basins in California.
XII	332	North Pacific coast basins.

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[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

A list of reports containing stream-flow data is presented in the following table:

Stream-flow data in reports of the United States Geological Survey.

[A—Annual Report; B—Bulletin; WS—Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	do	1903.
WS 124 to 135	do	1904.
WS 165 to 178	do	1905.
WS 201 to 214	do	1906.
WS 241 to 252	do	1907-8.
WS 261 to 272	do	1909.
WS 281 to 292	do	1910.
WS 301 to 312	do	1911.
WS 321 to 332	do	1912.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for any station in the area covered by Part I are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, and 321, which contain records for the New England streams from 1903 to 1912. The year covered by the report is indicated at the head of the column in which the paper is listed.

Numbers of water-supply papers containing results of stream measurements, 1899–1912.

	1899 [a]	1900 [b]	1901	1902	1903	1904	1905	1906	1907–8	1909	1910	1911	1912
North Atlantic coast (St. John River to York River)	35	47, [c]48	65, 75	82	97	[d]124, [e]125, [f]126	[d]165, [e]166, [f]167	[d]201, [e]202, [f]203	241	261	281	301	321
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g]35, 36	48	65, 75	[g]82, 83	[g]97, 98	[f]126, 127	[f]167, 168	[f]203, 204	242	262	282	302	322
Ohio River basin	36	48, [h]49	65, 75	83	98	128	169	205	243	263	283	303	323
St. Lawrence River and Great Lakes	36	49	65, 75	[i]82, 83	97	129	170	206	244	264	284	304	324
Hudson Bay and upper Mississippi River	36	49	[j]65, 66, 75	[j]83, 85	[j]98, 99, 100	[j]128, 130	171	207	245	265	285	305	325
Missouri River	[k]36, 37	49, [l]50	66, 75	84	99	130, [m]131	172	208	246	266	286	306	326
Lower Mississippi River	37	50	[j]65, 66, 75	[j]83, 84	[j]98, 99	[j]128, 131	[j]169, 173	[j]205, 209	247	267	287	307	327
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248	268	288	308	328
Colorado River	[n]37, 38	50	66, 75	85	100	133	175, [o]177	211	249	269	289	309	329
Great Basin	38, [p]39	51	66, 75	85	100	133, [q]134	176, [q]177	212, [q]213	250, [q]251	270, [q]271	290	310	330
Pacific coast in California	38, [r]39	51	66, 75	85	100	134	177	213	251	271	291	311	331
North Pacific coast	38	51	66, 75	85	100	135	[s]177, 178	214	252	272	292	312	332

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, part 4.

[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Estimates for 1900 in Twenty-second Annual Report, part 4.

[c] Wissahickon and Schuylkill rivers to James River.

[d] New England rivers only.

[e] Hudson River to Delaware River, inclusive.

[f] Susquehanna River to Yadkin River, inclusive.

[g] James River only.

[h] Scioto River.

[i] Lake Ontario and tributaries to St. Lawrence River proper.

[j] Tributaries of Mississippi from east.

[k] Gallatin River.

[l] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[m] Platte and Kansas rivers.

[n] Green and Gunnison rivers and Grand River above junction with Gunnison.

[o] Below junction with Gila.

[p] Mohave River only.

[q] Great Basin in California, except Truckee and Carson drainage basins.

[r] Kings and Kern rivers and south Pacific coast drainage basins.

[s] Rogue, Umpqua, and Siletz rivers only.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.
2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.
3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.
4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., room 18, Federal Building.
Atlanta, Ga., Post Office Building.
St. Paul, Minn., Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 302 Chamber of Commerce Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
Tacoma, Wash., Federal Building.
San Francisco, Cal., 505 Customhouse.
Los Angeles, Cal., Federal Building.
Santa Fe, N. Mex., Capitol Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications will be sent on application to the Director of the United States Geological Survey, Washington, D. C.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches, and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off in depth in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot a second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off, depth in inches," is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Second-feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	0.03719	1.041	1.079	1.116	1.153
2.........	.07438	2.083	2.157	2.231	2.306
3.........	.11157	3.124	3.236	3.347	3.459
4.........	.14876	4.165	4.314	4.463	4.612
5.........	.18595	5.207	5.393	5.578	5.764
6.........	.22314	6.248	6.471	6.694	6.917
7.........	.26033	7.289	7.550	7.810	8.070
8.........	.29752	8.331	8.628	8.926	9.223
9.........	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	1.983	55.54	57.52	59.50	61.49
2.........	3.967	111.1	115.0	119.0	123.0
3.........	5.950	166.6	172.6	178.5	184.5
4.........	7.934	222.1	230.1	238.0	246.0
5.........	9.917	277.7	287.6	297.5	307.4
6.........	11.90	333.2	345.1	357.0	368.9
7.........	13.88	388.8	402.6	416.5	430.4
8.........	15.87	444.3	460.2	476.0	491.9
9.........	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of March 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day equals 86,400 cubic feet.
1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharge and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

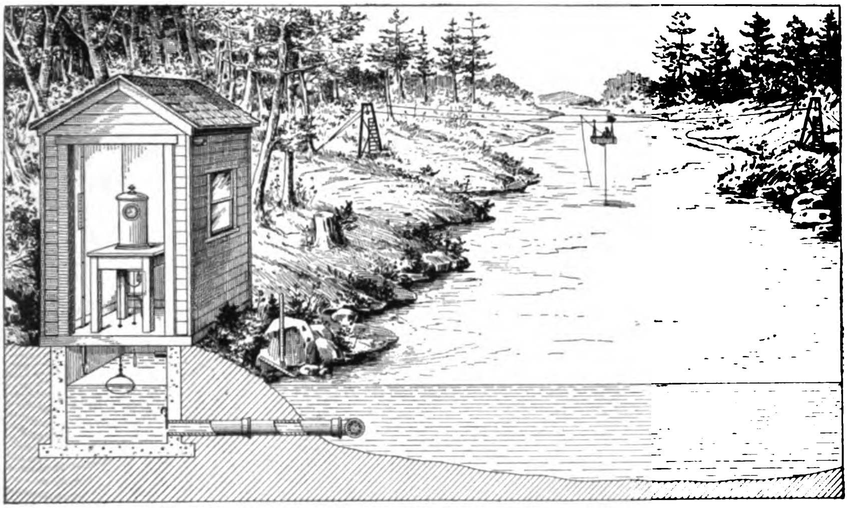
The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge by plotting gage heights in feet as ordinates and discharge in second-feet as abscissas.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

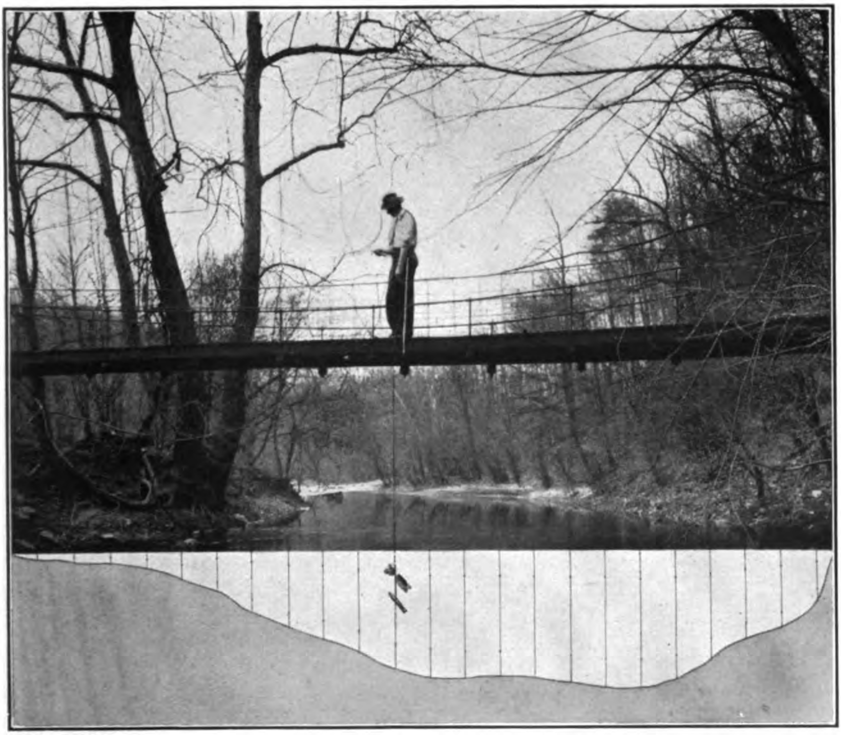
In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column at "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on pages 9 and 10, are based.

The base data presented in this report, unless otherwise stated in description of station, have been collected by the methods commonly used at current-meter gaging stations and described in standard text books.

Plate I shows typical gaging stations. Plate II shows current meters used in the work.

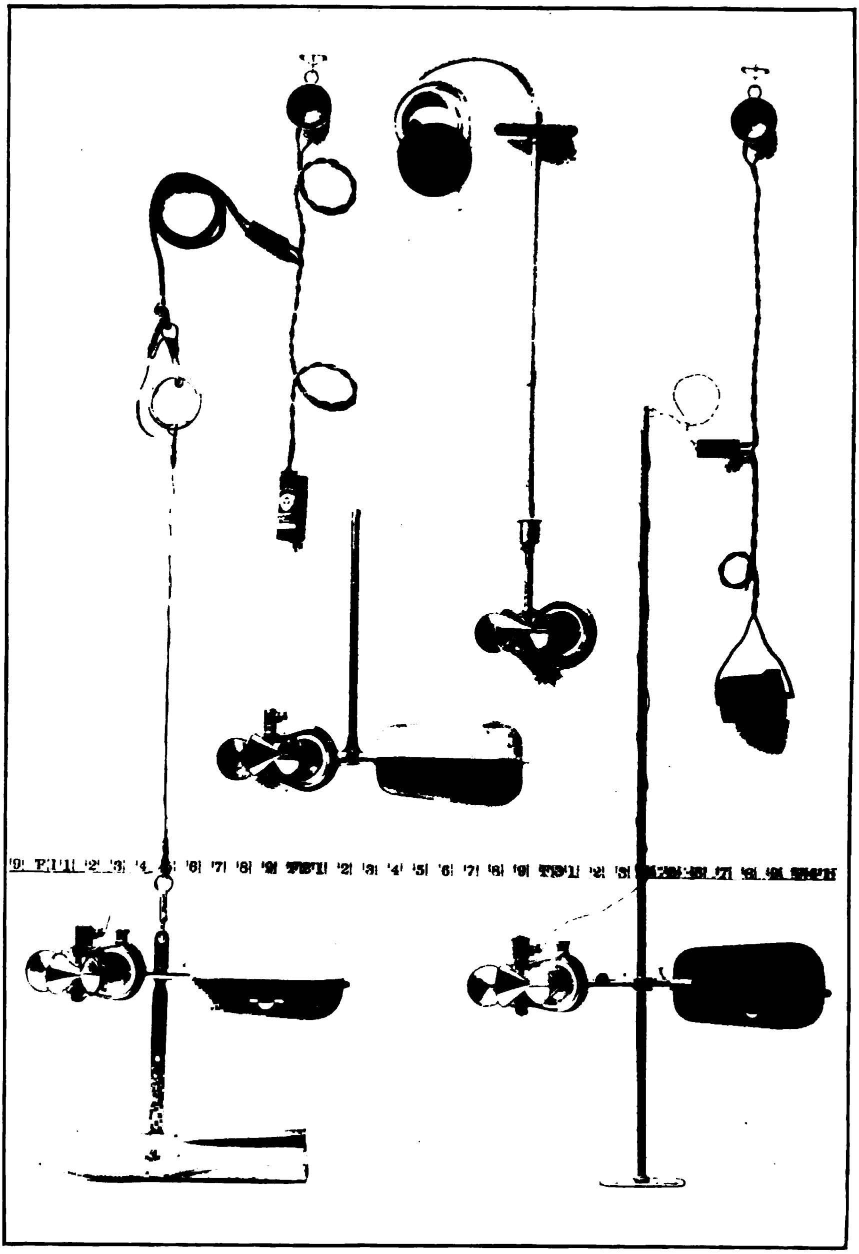


A. CABLE STATION WITH AUTOMATIC GAGE.



B. FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



PRICE CURRENT METERS.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables, "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the Survey engineers are published, not only to comply with the law, but also to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION.

Special acknowledgments are due for financial assistance rendered by the following individuals and corporations: Virginia-Carolina Power Co., William C. Whitner, president; Southern Aluminum Co.; Northern Contracting Co.; Central Georgia Power Co.; Columbus Power Co.; Mr. B. H. Hardaway; Alabama Geological Survey; North Carolina Electric & Power Co.; and North Georgia Electric Co.

DIVISION OF WORK.

The field data in the James and Roanoke drainage basins were collected under the direction of R. H. Bolster, hydraulic engineer, by E. A. Porter, H. J. Jackson, and C. L. Batchelder.

The field data for all drainage basins south of Roanoke River were collected by M. R. Hall and W. E. Hall, district engineers.

The ratings, special estimates, and studies of the completed data were made by W. E. Hall and C. H. Pierce. The computations and preparation of the data for publication were made by C. H. Pierce, C. L. Batchelder, G. A. Wallace, and M. I. Walters.

The report was edited by Mrs. B. D. Wood.

GAGING STATIONS.

The following list comprises the gaging stations regularly maintained in south Atlantic coast and eastern Gulf of Mexico drainage basins by the United States Geological Survey and cooperative parties. Data for these stations have appeared in the published reports as shown in tables on pages 7 and 8. The stations are arranged by river basins and appear in downstream order, tributaries of main streams being indicated by indention.

- South Atlantic coast drainage basins:
  - James River basin:
    - Jackson River at Covington, Va., 1907–8.
    - James River at Buchanan, Va., 1895–1912.
    - James River at Holcomb Rock, Va., 1900–1912.
    - James River at Cartersville, Va., 1899–1912.
      - Cowpasture River near Clifton Forge, Va., 1907–8.
      - North Fork of James River near Glasgow, Va., 1895–1905.
      - Appomattox River at Mattoax, Va., 1900–1905.

South Atlantic coast drainage basins—Continued.

- Roanoke River basin:
    - Roanoke River at Roanoke, Va., 1896–1912.
    - Roanoke River at Randolph, Va., 1900–1906.
    - Roanoke River above the Dan at Clarksville, Va., 1895–1898.
    - Roanoke River at Old Gaston, N. C., 1911–12.
    - Roanoke River at Weldon, N. C., 1912.
    - Roanoke River at Neal, N. C., 1896–1903.
    - Tinker Creek at Roanoke, Va., 1907–8.
    - Back Creek near Roanoke, Va., 1907–8.
    - Dan River at Madison, N. C., 1903–1908.
    - Dan River at South Boston, Va., 1900–1907.
    - Dan River at Clarksville, Va., 1895–1898.
        - Banister River at Houston, Va., 1904–5.
- Tar River basin:
    - Tar River near Tarboro, N. C., 1896–1900.
- Neuse River basin:
    - Neuse River near Selma, N. C., 1896–1900.
- Cape Fear River basin:
    - Haw River near Moncure, N. C., 1898–99.
    - Cape Fear River near Fayetteville, N. C., 1899–1903.
        - Deep Creek near Cumnock, N. C., 1900–1902.
        - Deep Creek near Moncure, N. C., 1898–99.
        - Rockfish Creek near Brunt, N. C., 1902–3.
- Yadkin River basin:
    - Yadkin River at North Wilkesboro, N. C., 1903–1909.
    - Yadkin River near Siloam, N. C., 1900–1901.
    - Yadkin River near Salisbury, N. C., 1895–1909; 1911–12.
    - Yadkin River near Norwood, N. C., 1896–1899.
    - Yadkin River near Peedee, N. C., 1906–1912.
    - Peedee River at Cheraw, S. C., 1909–1912.
- Santee River basin:
    - Catawba River at Old Fort, N. C., 1907.
    - Catawba River near Morganton, N. C., 1900–1909.
    - Catawba River near Catawba, N. C., 1896–1905.
    - Catawba River near Rockhill, S. C., 1895–1903.
    - Wateree River near Camden, S. C., 1904–1910.
        - Mill Creek at Old Fort, N. C., 1907.
        - Linville River at Fonta Flora, N. C., 1907–8.
        - Linville River near Bridgewater, N. C., 1900.
        - Johns River at Collettsville, N. C., 1907.
        - Johns River near Morganton, N. C., 1900–1901.
    - Congaree River basin:
        - Broad River (of the Carolinas) at Uree, N. C., 1907–1909.
        - Broad River (of the Carolinas) at Dellinger, S. C., 1900–1901.
        - Broad River (of the Carolinas) near Gaffney, S. C., 1896–1899.
        - Broad River (of the Carolinas) at Alston, S. C., 1896–1907.
            - Green River near Saluda, N. C., 1907–1909.
            - Second Broad River near Logan's store, N. C., 1907–8.
            - Saluda River near Waterloo, S. C., 1896–1905.
            - Saluda River near Ninety Six, S. C., 1905.
- Savannah River basin:
    - Chattooga River near Clayton, Ga., 1907–8.
    - Tugaloo River near Toccoa, Ga., 1907–8.
    - Tugaloo River near Madison, S. C., 1898–1910.

- South Atlantic coast drainage basins—Continued.
  - Savannah River basin—Continued.
    - Savannah River near Calhoun Falls, S. C., 1896–1903.
    - Savannah River at Woodlawn, S. C., 1905–1910.
    - Savannah River at Augusta, Ga., 1899–1906.
      - Stekoa Creek near Clayton, Ga., 1907–8.
      - Tallulah River at Tallulah Falls, Ga., 1900–1912.
      - Tallulah River at Mathis, Ga., 1912.
      - Chauga River near Madison, S. C., 1907.
      - Seneca River near Clemson College, S. C., 1903–1905.
      - Broad River (of Georgia) near Carlton, Ga., 1897–1912.
  - Ogeechee River basin:
    - Ogeechee River near Millen, Ga., 1903.
      - Williamsons Swamp Creek near Davisboro, Ga., 1903–4.
      - Cannoochee River near Groveland, Ga., 1903–1907.
  - Altamaha River basin:
    - South River near Lithonia, Ga., 1903–4.
      - Ocmulgee River near Jackson, Ga., 1906–1912.
      - Ocmulgee River near Flovilla, Ga., 1901–1905.
      - Ocmulgee River at Macon, Ga., 1893–1912.
      - Yellow River at Almon, Ga., 1897–1901.
      - Alcovy River near Covington, Ga., 1901–1904.
      - Alcovy River near Stewart, Ga., 1905–6.
      - Towaliga River near Juliette, Ga., 1899–1901.
      - Oconee River at Barnett Shoals, near Watkinsville, Ga., 1901–2.
      - Oconee River near Greensboro, Ga., 1903–1912.
      - Oconee River at Carey, Ga., 1896–1898.
      - Oconee River at Fraleys Ferry, near Milledgeville, Ga., 1905–1912.
      - Oconee River at Milledgeville, Ga., 1893–1905.
      - Oconee River at Dublin, Ga., 1897–1912.
        - Middle Oconee River near Athens, Ga., 1901–2.
        - Apalachee River near Buckhead, Ga., 1901–1908.
      - Ohoopee River near Reidsville, Ga., 1903–1907.
  - St. John River basin:
    - Silver Springs River near Silver Springs, Fla., 1906.
- Eastern Gulf of Mexico drainage basins:
  - Suwanee River basin:
    - Suwanee River near White Springs, Fla., 1906–1908.
  - Apalachicola River basin:
    - Chattahoochee River near Aerial, Ga., 1907–1909.
    - Chattahoochee River near Leaf, Ga., 1907.
    - Chattahoochee River near Gainesville, Ga., 1901–1903.
    - Chattahoochee River near Buford, Ga., 1901.
    - Chattahoochee River near Norcross, Ga., 1902–1912.
    - Chattahoochee River near Oakdale, Ga., 1895–1904.
    - Chattahoochee River at West Point, Ga., 1896–1912.
    - Chattahoochee River at Columbus, Ga., 1912.
    - Chattahoochee River at Alaga, Ala., 1908–1912.
      - Soque River near Demorest, Ga., 1904–1909.
      - Sweetwater Creek near Austell, Ga., 1904–5.
      - Flint River near Woodbury, Ga., 1900–1912.
      - Flint River near Culloden, Ga., 1911–12.
      - Flint River near Mussela, Ga., 1907.
      - Flint River near Montezuma, Ga., 1905–1912.
      - Flint River at Albany, Ga., 1902–1912.

- Eastern Gulf of Mexico drainage basins—Continued.
  - Apalachicola River basin—Continued.
    - Chattahoochee River at Alaga, Ala., 1908–1912—Continued.
      - Flint River at Bainbridge, Ga., 1908–1912.
        - Kinchafoonee Creek near Leesburg, Ga., 1905–1909.
        - Kinchafoonee Creek near Albany, Ga., 1903.
          - Muckalee Creek near Albany, Ga., 1903.
        - Ichawaynochaway Creek at Milford, Ga., 1905–1907.
    - Chipola River near Altha, Fla., 1912.
  - Choctawhatchee River basin:
    - Choctawhatchee River near Newton, Ala., 1906–1908; 1911–12.
    - Choctawhatchee River near Geneva, Ala., 1904.
      - Double Bridge Creek at Geneva, Ala., 1904.
      - Pea River at Pera, Ala., 1904–1912.
      - Pea River at Elba, Ala., 1906.
  - Escambia River basin:
    - Conecuh River at Beck, Ala., 1904–1912.
  - Mobile River basin:
    - Cartecay River near Cartecay, Ga., 1904–5, 1907.
    - Coosawattee River at Carters, Ga., 1896–1908.
    - Oostanaula River at Resaca, Ga., 1896–1912.
    - Coosa River at Rome, Ga., 1897–1903.
    - Coosa River at Lock No. 4, above Riverside, Ala., 1890–1901.
    - Coosa River at Riverside, Ala., 1896–1912.
    - Coosa River at Lock No. 5, near Childersburg, Ala., 1892–1897.
    - Coosa River near Wetumpka, Ala., 1896–1898.
    - Alabama River at Montgomery, Ala., 1899–1903.
    - Alabama River at Selma, Ala., 1900–1912.
      - Ellijay River at Ellijay, Ga., 1907.
      - Conasauga River at Beaverdale, Ga., 1907–8.
      - Etowah River near Ball Ground, Ga., 1907–1912.
      - Etowah River at Canton, Ga., 1892–1905.
      - Etowah River near Rome, Ga., 1904–1912.
      - Etowah River at Rome, Ga., 1903.
        - Amicalola River near Potts Mountain, Ga., 1907–8; 1910–1912.
      - Choccolocco Creek at Jenifer, Ala., 1903–1908.
      - Talladega Creek at Nottingham, Ala., 1900–1904.
      - Tallapoosa River at Sturdevant, Ala., 1900–1912.
      - Tallapoosa River near Susanna, Ala., 1900–1901.
      - Tallapoosa River at Milstead, Ala., 1897–1903.
        - Hillabee Creek near Alexander City, Ala., 1900–1903.
        - Big Sandy Creek near Dadeville, Ala., 1900–1901.
      - Cahaba River at Centerville, Ala., 1901–1908.
      - Tombigbee River at Columbus, Miss., 1900–1912.
      - Tombigbee River at Epes, Ala., 1900–1912.
        - Black Warrior River near Cordova, Ala., 1900–1912.
        - Black Warrior River near Coal, Ala., 1908–1910.
        - Black Warrior River at Tuscaloosa, Ala., 1889–1905..
          - Clear Creek near Elk, Ala., 1904–5.
          - Locust Fork of Black Warrior River at Palos, Ala., 1901–1905.
            - Village Creek near Mulga, Ala., 1909.
              - Camp Branch near Ensley, Ala., 1908–1910.
              - Venison Branch near Mulga, Ala., 1908–9.
  - Pearl River basin:
    - Pearl River at Jackson, Miss., 1901–1912.
      - Bogue Chitto at Warnerton, La., 1906.

SOUTH ATLANTIC COAST DRAINAGE BASINS.

JAMES RIVER BASIN.

JAMES RIVER AT BUCHANAN, VA.

Location.—At the highway bridge near the Chesapeake & Ohio Railway depot at Buchanan, Va.

Records available.—August 18, 1895, to December 31, 1912.

Drainage area.—2,060 square miles.

Gage.—A chain gage, attached to the highway bridge, was installed November 21, 1903, to replace the original wire gage read from August 18, 1895, to that date. The datum of the gage was lowered 2 feet April 3, 1897, to avoid negative readings; subsequently the datum of the gage has remained constant.

Channel.—The bed of the river under the bridge is composed of rock overlain with a deep deposit of mud. There is a rock control several hundred feet below the station.

Discharge measurements.—Made from the downstream side of two-span highway bridge.

Winter flow.—Occasionally affected by ice for short periods.

Accuracy.—Rating curve well developed. Published data considered good.

Cooperation.—Previous to July 15, 1906, the observations of daily gage height were made by employees of the Geological Survey; since that time gage height records have been furnished by the United States Weather Bureau.

The following discharge measurement was made by Jackson and Batchelder.

November 21, 1912, gage height, 2.21 feet; discharge, 560 second-feet.

Daily gage height, in feet, of James River at Buchanan, Va., for 1912.

[D. D. Booze, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.7	5.0	4.8	6.7	3.8	3.0	3.6	2.1	1.9	2.2	2.0	2.0
2	5.0	4.5	4.5	6.7	3.7	2.9	3.8	2.1	1.9	2.1	2.0	2.0
3	4.8	4.2	4.3	8.0	3.6	2.9	3.4	2.1	1.9	2.1	2.0	2.0
4	4.6	4.0	4.0	6.9	3.4	2.8	3.0	2.1	1.8	2.0	2.0	2.0
5	4.2	3.8	3.9	6.2	3.3	2.7	2.9	2.1	1.8	2.0	2.0	2.0
6	3.6	3.7	3.8	5.4	3.5	2.7	3.0	2.0	1.8	2.0	2.0	2.2
7	3.2	3.6	3.7	5.1	4.2	2.6	3.0	2.0	1.8	2.0	2.6	2.4
8	3.0	3.4	3.6	4.8	4.0	2.6	2.9	2.0	1.8	2.0	5.3	2.5
9	3.0	3.3	4.3	4.5	3.8	2.5	2.8	2.0	1.8	1.9	4.5	2.4
10	3.0	3.2	5.2	4.2	3.6	2.5	2.7	2.0	1.8	1.9	3.7	2.3
11	3.4	3.1	4.9	4.0	3.4	2.4	2.7	2.0	1.9	1.9	3.1	2.2
12	3.3	3.0	4.6	3.9	8.4	2.4	2.9	2.0	1.9	1.9	2.9	2.2
13	3.2	2.9	6.9	3.7	10.6	2.4	2.8	2.0	1.9	1.9	2.7	2.2
14	3.1	2.8	7.6	3.6	8.0	2.3	2.7	2.0	1.8	1.9	2.6	2.2
15	3.0	2.8	7.3	3.5	6.0	2.3	2.7	1.9	1.8	2.0	2.5	2.1
16	3.0	2.7	14.4	3.5	7.3	2.3	2.6	1.9	1.8	2.0	2.4	2.1
17	3.0	2.7	9.0	3.4	10.8	2.3	2.6	1.9	1.8	2.0	2.3	2.1
18	2.9	2.7	6.7	3.4	7.6	2.3	2.5	1.9	1.8	2.0	2.3	2.1
19	3.0	2.9	5.8	3.4	6.0	2.3	2.4	1.9	2.1	2.0	2.2	2.1
20	3.3	2.9	5.3	4.0	5.6	2.5	2.4	1.9	2.0	2.0	2.2	2.1
21	3.8	3.3	5.1	3.9	5.2	2.6	2.3	1.9	2.0	2.0	2.2	2.0
22	4.2	8.2	5.3	3.7	4.8	2.5	2.2	1.9	1.9	2.0	2.2	2.0
23	4.0	8.0	5.1	3.7	4.4	2.5	2.2	1.9	2.1	2.0	2.2	2.0
24	3.9	5.6	5.9	3.5	4.1	2.5	2.2	1.9	2.4	2.0	2.2	2.0
25	3.9	5.8	7.0	3.4	3.9	2.5	2.2	1.9	2.9	2.0	2.2	2.0
26	3.9	5.8	7.8	3.4	3.7	2.7	2.2	1.9	3.4	2.0	2.1	2.0
27	3.8	6.8	7.0	3.4	3.5	2.9	2.6	1.9	2.9	2.0	2.1	2.0
28	3.6	7.2	6.0	4.1	3.3	3.6	2.4	1.9	2.6	2.0	2.1	2.0
29	3.5	5.7	9.6	4.0	3.2	3.4	2.2	1.9	2.4	2.0	2.1	2.0
30	4.1	....	16.2	3.9	3.1	3.3	2.2	1.9	2.4	2.0	2.0	2.9
31	5.8	....	8.4	....	3.0	....	2.2	1.9	....	2.0	....	6.1

Daily discharge, in second-feet, of James River at Buchanan, Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,450	5,100	4,660	9,300	2,680	1,480	2,340	520	385	600	450	450
2	5,100	4,030	4,030	9,300	2,500	1,360	2,680	520	385	520	450	450
3	4,660	3,430	3,620	13,100	2,340	1,360	2,030	520	385	520	450	450
4	4,240	3,040	3,040	9,850	2,030	1,240	1,480	520	325	450	450	450
5	3,430	2,680	2,860	7,970	1,880	1,120	1,360	520	325	450	450	450
6	2,340	2,500	2,680	6,020	2,180	1,120	1,480	450	325	450	450	600
7	1,740	2,340	2,500	5,330	3,430	1,000	1,480	450	325	450	1,000	790
8	1,480	2,030	2,340	4,660	3,040	1,000	1,360	450	325	450	5,780	890
9	1,480	1,880	3,620	4,030	2,680	890	1,240	450	325	385	4,030	790
10	1,480	1,740	5,560	3,430	2,340	890	1,120	450	325	385	2,500	690
11	2,030	1,610	4,880	3,040	2,030	790	1,120	450	385	385	1,610	600
12	1,880	1,480	4,240	2,860	14,400	790	1,360	450	385	385	1,360	600
13	1,740	1,360	9,850	2,500	22,700	790	1,240	450	385	385	1,120	600
14	1,610	1,240	11,900	2,340	13,100	690	1,120	450	325	385	1,000	600
15	1,480	1,240	11,000	2,180	7,460	690	1,120	385	325	450	890	520
16	1,480	1,120	40,700	2,180	11,000	690	1,000	385	325	450	790	520
17	1,480	1,120	16,500	2,030	23,600	690	1,000	385	325	450	690	520
18	1,360	1,120	9,300	2,030	11,900	690	890	385	325	450	690	520
19	1,480	1,360	6,960	2,030	7,460	690	790	385	520	450	600	520
20	1,880	1,360	5,780	3,040	6,480	890	790	385	450	450	600	520
21	2,680	1,880	5,330	2,860	5,560	1,000	690	385	450	450	600	450
22	3,430	13,800	5,780	2,500	4,660	890	600	385	385	450	600	450
23	3,040	13,100	5,330	2,500	3,820	890	600	385	520	450	600	450
24	2,860	6,480	7,210	2,180	3,240	890	600	385	790	450	600	450
25	2,860	6,960	10,100	2,030	2,860	890	600	385	1,360	450	600	450
26	2,860	6,960	12,500	2,030	2,500	1,120	600	385	2,030	450	520	450
27	2,680	9,580	10,100	2,030	2,180	1,360	1,000	385	1,360	450	520	450
28	2,340	10,700	7,460	3,240	1,880	2,340	790	385	1,000	450	520	450
29	2,180	6,720	18,700	3,040	1,740	2,030	600	385	790	450	520	450
30	3,240	....	50,300	2,860	1,610	1,880	600	385	790	450	450	1,360
31	6,960	....	14,400	....	1,480	....	600	385	....	450	....	7,720

NOTE.—Daily discharge computed from a rating curve fairly well defined below 20,000 second-feet.

Monthly discharge of James River at Buchanan, Va., for 1912.

[Drainage area, 2,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	6,960	1,360	2,640	1.28	1.48	A.
February	13,800	1,120	4,070	1.98	2.14	A.
March	50,300	2,340	9,780	4.75	5.48	B.
April	13,100	2,030	4,080	1.98	2.21	A.
May	23,600	1,480	5,700	2.77	3.19	B.
June	2,340	690	1,070	.519	.58	A.
July	2,680	600	1,110	.539	.62	A.
August	520	385	426	.207	.24	A.
September	2,030	325	555	.269	.30	A.
October	600	385	447	.217	.25	A.
November	5,780	450	1,030	.500	.56	A.
December	7,720	450	795	.368	.44	A.
The year	50,300	325	2,640	1.28	17.49	

JAMES RIVER AT HOLCOMB ROCK, VA.

Location.—At the works of the Wilson Aluminum Co., at Holcomb Rock, Va.

Records available.—Gage heights January 1, 1900, to December 31, 1912.

Drainage area.—Not measured.

Gage.—A copper float inclosed in a stilling box, with a vertical rod extending up through the power-house floor.

Discharge measurements.—No discharge measurements have been made at this station.

Cooperation.—Gage heights have been furnished the Geological Survey by George O. Seward, general manager of the Wilson Aluminum Co.

Daily gage height, in feet, of James River at Holcomb Rock, Va., for 1912.

[J. H. Webb, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.7	4.4	4.5	7.05	2.65	2.05	2.25	1.35	0.85	1.35	.85	1.05
2	5.0	3.5	3.9	6.55	2.6	1.9	2.15	1.3	.85	1.3	1.0	1.3
3	4.15	3.1	3.4	8.2	2.5	2.05	2.1	1.3	.9	1.0	.85	1.2
4	3.6	2.35	3.2	7.0	2.5	2.0	1.8	.85	.85	1.2	.9	1.15
5	2.35	2.4	3.0	5.65	2.1	1.9	1.85	1.05	.8	1.1	.8	1.25
6	2.6	2.7	2.75	4.85	2.35	1.8	1.95	1.0	.85	.8	.80	1.4
7	2.65	2.45	2.65	4.5	2.3	1.8	1.95	1.0	.75	1.1	1.9	1.35
8	2.65	2.15	2.55	4.3	2.8	1.65	1.8	.85	.9	.95	4.45	1.15
9	2.35	2.1	3.15	3.8	2.4	1.45	1.7	1.0	1.05	.9	3.75	1.55
10	2.15	2.1	4.1	3.55	2.7	1.45	1.5	1.0	1.0	.95	3.05	1.5
11	2.25	1.7	4.1	3.35	2.4	1.4	1.5	.9	1.0	1.0	2.35	1.4
12	2.2	1.85	4.05	3.2	12.85	1.4	1.5	1.0	.95	.95	2.05	1.25
13	1.95	1.8	7.25	2.95	12.05	1.45	1.85	.80	.95	.65	1.9	1.35
14	1.55	1.85	7.75	2.75	8.0	1.4	1.4	1.15	.55	1.0	1.8	1.2
15	1.05	1.75	8.95	2.8	6.1	1.3	2.3	1.1	.85	.75	1.7	.85
16	2.15	1.7	14.95	2.75	7.1	1.2	1.65	.95	.8	.85	1.7	1.25
17	1.85	1.65	10.5	3.45	11.1	1.35	1.55	.8	.0	1.1	1.25	1.3
18	1.8	1.6	7.3	4.0	7.95	1.45	1.45	.8	.9	.9	1.5	1.15
19	1.9	1.7	5.95	3.6	5.95	1.4	1.6	.7	1.5	1.05	1.25	1.3
20	2.6	1.85	5.2	3.55	4.95	1.5	1.6	.95	1.4	.65	1.15	1.1
21	3.3	2.25	4.75	2.9	4.2	1.5	1.4	1.0	1.0	.85	1.25	1.25
22	3.2	7.55	4.65	2.9	3.7	1.4	1.4	1.0	.75	.85	1.3	1.0
23	2.95	8.65	4.4	2.8	3.35	1.35	1.4	.75	1.75	1.0	1.25	1.15
24	2.75	5.4	4.9	2.7	3.0	1.55	1.35	.9	3.9	1.05	1.05	1.15
25	2.6	4.6	9.15	2.55	2.8	1.45	1.4	.85	2.85	1.0	1.35	1.1
26	2.6	4.3	9.85	2.35	2.5	1.8	1.35	.85	2.45	.95	1.3	1.2
27	2.5	7.5	7.1	2.4	2.55	1.8	1.4	1.0	2.1	.8	1.2	1.15
28	2.4	7.65	5.8	2.3	2.45	2.5	1.4	.8	1.8	.9	1.2	1.15
29	2.4	5.65	11.8	2.85	2.35	2.4	1.35	.85	1.35	.95	1.15	1.1
30	2.85	......	15.45	2.8	2.3	2.0	1.4	.85	1.6	1.0	1.0	1.25
31	4.95	......	9.1	......	2.15	......	1.15	.9	......	.8	......	1.15

JAMES RIVER AT CARTERSVILLE, VA.

Location.—At the highway bridge crossing James River between Pemberton and Cartersville, about 50 miles above Richmond.

Records available.—January 1, 1899, to December 31, 1912.

Drainage area.—6,230 square miles.

Gage.—A standard chain gage was attached to the highway bridge July 24, 1903, to replace the wire gage which had been used from January 1, 1899, to that date. The datum of the gage has remained the same since the station was established.

Channel.—The left bank overflows for several hundred feet at a stage of about 20 feet. The right bank does not overflow.

Discharge measurements.—Made from downstream side of six-span highway bridge.

Winter flow.—Occasionally affected by ice for short periods during severe winters.

Accuracy.—Rating curve well developed for ordinary stages. Above the overflow point the discharge is uncertain.

Discharge measurements of James River at Cartersville, Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 18	E. A. Porter	12.8	35,100
Nov. 20	Jackson and Batchelder	1.84	3,010

Daily gage height, in feet, of James River at Cartersville, Va., for 1912.

[B. W. Palmore, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.1	5.2	7.7	10.1	3.9	2.9	3.1	1.1	0.62	2.5	1.1	1.3
2	5.8	5.4	6.0	9.0	3.8	2.8	3.0	1.1	.61	1.9	1.05	1.35
3	6.1	4.3	5.3	8.6	3.4	2.5	2.4	1.15	.57	1.7	1.1	1.3
4	5.2	4.1	4.6	9.4	3.3	2.5	2.5	1.2	.56	1.5	1.1	1.5
5	4.5	3.6	4.2	8.2	3.2	2.4	2.4	1.2	.58	1.45	1.1	1.7
6	3.7	3.4	4.1	7.2	3.2	2.2	2.3	1.05	.61	1.4	1.05	1.9
7	3.6	3.3	4.2	6.7	3.5	2.6	2.1	1.0	.60	1.3	1.2	2.0
8	3.2	3.2	4.6	6.0	3.9	2.7	1.9	1.0	.68	1.15	10.6	1.9
9	2.8	2.8	5.1	5.5	4.1	2.5	2.2	.94	1.05	1.1	6.6	1.7
10	2.7	2.6	6.0	5.1	3.6	2.0	1.8	.91	.98	1.1	6.1	1.6
11	2.8	2.4	5.2	4.7	3.7	2.0	1.7	.98	.92	1.05	4.1	1.7
12	2.8	2.5	5.9	4.4	13.8	1.8	1.8	1.0	.74	1.0	3.3	1.7
13	3.2	2.5	12.2	4.3	21.4	1.6	1.7	.92	.69	1.0	2.7	1.7
14	4.1	2.3	11.0	4.4	18.0	1.5	1.7	.94	.64	1.15	2.5	1.6
15	5.7	2.2	14.3	4.4	11.8	1.5	1.7	.92	.58	1.2	2.5	1.5
16	5.7	2.3	21.4	4.3	11.8	1.45	2.2	.92	.54	1.25	2.4	1.4
17	5.8	2.4	19.0	4.3	14.5	2.6	2.1	1.2	.56	1.2	2.3	1.4
18	5.8	2.8	13.5	4.3	13.9	2.5	1.7	1.4	.64	1.0	2.0	1.5
19	6.2	3.9	9.4	5.6	10.6	2.4	1.9	1.5	1.05	1.15	1.9	1.5
20	6.2	3.8	7.8	4.6	8.1	2.3	2.2	.94	1.8	1.15	1.9	1.8
21	6.3	4.0	6.9	4.4	6.6	1.8	2.1	.88	1.2	1.2	1.6	1.6
22	6.2	8.4	6.5	4.3	5.9	1.8	1.9	.84	1.1	1.25	1.5	1.4
23	5.6	8.7	6.1	4.3	5.4	2.0	1.2	.82	1.05	1.3	1.5	1.2
24	4.3	10.1	8.7	4.1	4.7	2.3	1.2	.82	11.1	1.45	1.4	1.4
25	3.8	8.8	10.1	3.7	4.4	2.0	1.4	.74	12.7	1.45	1.4	1.5
26	3.4	6.9	11.6	3.5	4.1	1.9	1.5	.70	5.7	1.35	1.35	1.45
27	3.4	12.6	11.5	3.3	3.8	1.9	1.7	.64	4.3	1.25	1.4	1.6
28	3.3	10.2	9.4	3.4	3.5	3.2	1.4	.59	4.3	1.1	1.4	1.7
29	3.3	9.7	14.5	3.6	3.2	2.9	1.05	.63	4.0	1.15	1.4	1.7
30	4.1	....	19.6	3.8	3.1	2.8	1.05	.65	2.5	1.1	1.3	2.4
31	5.1	....	16.3	....	3.3	....	1.1	.64	....	1.1	....	4.4

Daily discharge, in second-feet, of James River at Cartersville, Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13,300	10,800	18,000	26,100	7,580	5,310	5,750	1,740	980	4,460	1,740	2,090
2	12,400	11,400	13,000	22,300	7,340	5,090	5,530	1,740	965	3,230	1,660	2,180
3	13,300	8,540	11,100	20,900	6,420	4,460	4,250	1,820	905	2,830	1,740	2,090
4	10,800	8,060	9,280	23,700	6,190	4,460	4,460	1,910	890	2,450	1,740	2,450
5	9,030	6,880	8,300	19,600	5,970	4,250	4,250	1,910	920	2,360	1,740	2,830
6	7,110	6,420	8,060	16,500	5,970	3,830	4,040	1,660	965	2,270	1,660	3.230
7	6,880	6,190	8,300	15,000	6,650	4,670	3,630	1,570	950	2,090	1,910	3,430
8	5,970	5,970	9,280	13,000	7,580	4,880	3,230	1,570	1,070	1,820	27,800	3,230
9	5,090	5,090	10,600	11,600	8,060	4,460	3,830	1,470	1,660	1,740	14,700	2,830
10	4,880	4,670	13,000	10,600	6,880	3,430	3,030	1,430	1,540	1,740	13,300	2,640
11	5,090	4,250	10,800	9,530	7,110	3,430	2,830	1,540	1,440	1,660	8,060	2,830
12	5,090	4,460	12,700	8,780	39,700	3,030	3,030	1,570	1,160	1,570	6,190	2,830
13	5,970	4,460	33,700	8,540	72,700	2,640	2,830	1,440	1,086	1,570	4,880	2,830
14	8,060	4,040	29,300	8,780	57,200	2,450	2,830	1,470	1,010	1,820	4,460	2,640
15	12,200	3,830	41,700	8,780	32,200	2,450	2,830	1,440	920	1,910	4,460	2,450
16	12,200	4,040	72,700	8,540	32,200	2,360	3,830	1,440	860	2,000	4,250	2,270
17	12,400	4,250	61,700	8,540	42,500	4,670	3,630	1,910	890	1,910	4,040	2.270
18	12,400	5,090	38,600	8,540	40,100	4,460	2,830	2,270	1,010	1,570	3,430	2,450
19	13,500	7,580	23,700	11,900	27,800	4,250	3,230	2,450	1,660	1,820	3,230	2,450
20	13,500	7,340	18,300	9,280	19,300	4,040	3,830	1,470	3,030	1,820	3,230	3,030
21	13,800	7,820	15,600	8,780	14,700	3,030	3,630	1,380	1,910	1,910	2,640	2,640
22	13,500	20,300	14,400	8,540	12,700	3,030	3,230	1,310	1,740	2,000	2,450	2,270
23	11,900	21,300	13,300	8,540	13,400	3,430	1,910	1,280	1,660	2,090	2,450	1,910
24	8,540	26,100	21,300	8,060	9,530	4,040	1,910	1,280	29,600	2,360	2,270	2,270
25	7,340	21,600	26,100	7,110	8,780	3,430	2,270	1,160	35,500	2,360	2,270	2,450
26	6,420	15,600	31,400	6,650	8,060	3,230	2,450	1,100	12,200	2,180	2,180	2,360
27	6,420	35,200	31,100	6,190	7,340	3,230	2,830	1,010	8,540	2,000	2,270	2,640
28	6,190	26,400	23,700	6,420	6,650	5,970	2,270	935	8,540	1,740	2,270	2,830
29	6,190	24,700	42,500	6,880	5,970	5,310	1,660	995	7,820	1,820	2,270	2,830
30	8,060	....	64,500	7,340	5,750	5,090	1,660	1,020	4,460	1,740	2,090	4,250
31	10,600	....	49,800	....	6,190	....	1,749	1,010	....	1,740	....	8,780

NOTE.—Daily discharge computed from a rating curve, well defined below 10,000 second-feet and fairly well defined below 40,000 second-feet.

Monthly discharge of James River at Cartersville, Va., for 1912.

[Drainage area, 6,230 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	13,800	4,880	9,290	1.49	1.72	A.
February	35,200	3,830	11,100	1.78	1.92	B.
March	72,700	8,060	25,300	4.06	4.68	C.
April	26,100	6,190	11,500	1.85	2.06	B.
May	72,700	5,750	17,400	2.79	3.22	C.
June	5,970	2,360	3,950	.634	.71	A.
July	5,750	1,660	3,200	.514	.59	A.
August	2,450	935	1,490	.239	.28	A.
September	35,500	860	4,530	.727	.81	B.
October	4,460	1,570	2,080	.334	.39	A.
November	27,800	1,660	4,580	.735	.82	B.
December	8,780	1,910	2,850	.457	.53	A.
The year	72,700	860	8,110	1.30	17.73	

ROANOKE RIVER BASIN.

ROANOKE RIVER AT ROANOKE, VA.

Location.—At the Walnut Street highway bridge at Roanoke, Va

Records available.—July 10, 1896, to July 14, 1906; May 7, 1908, to December 31, 1912.

Drainage area.—388 square miles.

Gage.—A standard chain gage was attached to the Walnut Street Bridge November 28, 1903, to replace the wire gage which had been read from July 10, 1896, to that date. The datum of the gage has remained unchanged since the station was established.

Channel.—Nearly straight, 160 feet wide between bridge abutments; broken by one pier. The bed of the stream is composed of coarse gravel and small bowlders. The right bank is above high water but the left bank may overflow at extreme flood stages.

Discharge measurements.—Made from the downstream side of two-span highway bridge.

Winter flow.—Occasionally affected by ice for short periods.

Accuracy.—Owing to varying conditions of flow frequent measurements are required at low stages to adequately define the discharge curve from year to year.

Cooperation.—Gage-height records furnished through the courtesy of the Roanoke Railway & Electric Co., J. W. Hancock, general manager.

Discharge measurements of Roanoke River at Roanoke, Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 22	Jackson and Batchelder	0.88	132
22	....do	.86	131

Daily gage height, in feet, of Roanoke River at Roanoke, Va., for 1912.

[C. C. Hogshead, observer.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	1.8	2.2	3.8	1.7	1.3	1.7	1.2	0.8	1.1	0.8	0.9
2	1.7	1.6	1.8	3.2	1.7	1.3	1.6	1.1	.8	1.1	.8	.9
3	1.6	1.4	1.8	2.9	1.7	1.3	1.5	1.1	.8	1.0	.8	.8
4	1.55	1.4	1.8	2.6	1.6	1.2	1.4	1.0	.8	1.0	.8	.9
5	1.4	1.2	1.8	2.4	1.5	1.2	1.6	1.0	.8	.95	.8	.9
6	1.3	1.2	1.7	2.3	1.4	1.2	1.4	1.0	.8	.9	.8	1.3
7	1.25	1.2	1.6	2.2	1.4	1.2	1.4	1.0	.8	.9	1.6	1.4
8	1.25	1.2	1.7	2.1	1.4	1.2	1.3	1.0	.8	.8	1.8	1.3
9	1.2	1.15	1.8	2.0	1.3	1.1	1.5	1.0	.8	.8	1.4	1.3
10	1.2	1.1	2.5	1.9	1.3	1.1	1.5	.95	.8	.8	1.3	1.2
11	1.2	1.1	2.2	1.8	1.3	1.1	1.8	.95	.8	.8	1.2	1.1
12	1.2	1.1	2.4	1.7	8.5	1.1	1.6	.95	.8	.8	1.2	1.1
13	1.2	1.1	4.5	1.6	4.4	1.1	1.4	.90	.8	.8	1.1	1.1
14	1.2	1.1	7.6	1.6	3.8	1.1	1.5	.90	.8	.8	1.1	1.1
15	1.2	1.1	5.5	1.5	4.0	1.1	1.3	.90	.8	.8	1.0	1.1
16	1.0	1.1	4.2	1.5	4.5	1.1	1.2	.90	.8	.8	1.0	1.1
17	1.1	1.1	3.1	1.5	5.0	1.1	1.1	.90	1.0	.8	1.0	1.0
18	1.2	1.1	2.9	1.4	4.0	1.1	1.1	.90	1.2	.8	1.0	1.0
19	1.4	1.1	2.4	1.4	3.0	1.1	1.4	.85	.9	.8	1.0	1.0
20	1.7	1.1	2.3	1.4	2.2	1.2	1.5	.85	.9	.8	1.0	1.0
21	1.5	1.2	2.0	1.4	2.0	1.1	1.7	.85	.85	.8	1.0	1.0
22	1.4	3.6	2.6	1.4	1.9	1.2	1.7	.85	.85	.8	.9	1.0
23	1.4	2.2	2.7	1.3	1.8	1.2	1.6	.90	.9	.8	.9	1.0
24	1.4	2.1	2.5	1.3	1.7	1.25	1.5	.90	1.1	.8	.9	1.0
25	1.3	2.2	2.4	1.3	1.6	1.7	1.5	.90	3.3	.8	.9	1.0
26	1.3	2.8	2.3	1.3	1.5	1.3	1.4	.85	2.2	.8	.9	1.0
27	1.2	4.2	2.2	1.2	1.5	[a]2.6	1.4	.85	2.0	.8	.9	1.0
28	1.2	3.1	2.2	1.2	1.4	2.4	1.4	.85	1.8	.8	.9	1.0
29	1.2	2.8	7.2	1.3	1.4	1.7	1.3	.85	1.6	.8	.9	1.0
30	1.8	......	4.1	1.6	1.3	1.6	1.25	.85	1.3	.8	.9	1.1
31	2.1	......	4.0	......	1.3	......	1.2	.80	......	.8	......	1.7

[a] Estimated from observer's notes.

NOTE.—Gage heights Nov. 19 to 21 and possibly also on other days, estimated by observer.

Daily discharge, in second-feet, of Roanoke River at Roanoke, Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	550	550	850	2,640	490	282	490	242	115	206	115	143
2	490	430	550	1,900	490	282	430	206	115	206	115	143
3	430	326	550	1,540	490	282	375	206	115	173	115	115
4	402	326	550	1,230	430	242	326	173	115	173	115	143
5	326	242	550	1,030	375	242	430	173	115	158	115	143
6	282	242	490	940	326	242	326	173	115	143	115	282
7	262	242	430	850	326	242	326	173	115	143	430	326
8	262	242	490	770	326	242	282	173	115	115	550	282
9	242	224	550	690	282	206	375	173	115	115	326	282
10	242	206	1,130	620	282	206	375	158	115	115	282	242
11	242	206	850	550	282	206	550	158	115	115	242	206
12	242	206	1,030	490	8,980	206	430	158	115	115	242	206
13	242	206	3,580	430	3,440	206	326	143	115	115	206	206
14	242	206	7,700	430	2,640	206	375	143	115	115	206	206
15	242	206	4,930	375	2,900	206	282	143	115	115	173	206
16	173	206	3,180	375	3,580	206	242	143	115	115	173	206
17	206	206	1,780	375	4,260	206	206	143	173	115	173	173
18	242	206	1,540	326	2,900	206	206	143	242	115	173	173
19	326	206	1,030	326	1,660	206	326	129	143	115	173	173
20	490	206	940	326	850	242	375	129	143	115	173	173
21	375	242	690	326	690	206	490	129	129	115	173	173
22	326	2,390	1,230	326	620	242	490	129	129	115	143	173
23	326	850	1,330	282	550	242	430	143	143	115	143	173
24	326	770	1,130	282	490	262	375	143	206	115	143	173
25	282	850	1,030	282	430	490	375	143	2,020	115	143	173
26	282	1,440	940	282	375	282	326	129	850	115	143	173
27	242	3,180	850	242	375	1,230	326	129	690	115	143	173
28	242	1,780	850	242	326	1,030	326	129	550	115	143	173
29	242	1,440	7,220	282	326	490	282	129	430	115	143	173
30	550	......	3,040	430	282	430	262	129	282	115	143	206
31	770	......	2,900	......	282	......	242	115	......	115	......	490

NOTE.—Daily discharge computed from a rating curve well defined below 2,000 second-feet.

Monthly discharge of Roanoke River at Roanoke, Va., for 1912.

[Drainage area, 388 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	770	173	326	0.840	0.97	A.
February	3,180	206	622	1.60	1.73	A.
March	7,760	430	1,740	4.48	5.16	B.
April	2,640	242	640	1.65	1.84	A.
May	8,980	282	1,290	3.32	3.83	B.
June	1,230	206	316	.814	.91	A.
July	550	206	354	.912	1.05	A.
August	242	115	153	.394	.45	A.
September	2,020	115	266	.686	.77	A.
October	206	115	128	.330	.38	A.
November	550	115	189	.487	.54	A.
December	490	115	203	.523	.60	A.
The year	8,980	115	520	1.34	18.23	

ROANOKE RIVER AT OLD GASTON, N. C.

Location.—At railroad bridge of Roanoke Railway Co. at Old Gaston, N. C., 1½ miles north of Thelma, N. C., about three-fourths of a mile below mouth of Indian Creek and 2½ miles above mouth of Deep Creek.

Records available.—December 7, 1911, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to outside of guard timber on downstream side of second span from right end of decked plate girder railroad bridge of Roanoke Railway Co.

Channel.—Fairly permanent. Point of control, about 1 mile below, is of rock and probably permanent.

Discharge measurements.—Made from downstream side of bridge to which gage is attached. Measuring section broken by 11 bridge piers.

Floods.—Flood of 1877 highest known in this locality. No definite marks preserved at Old Gaston, but from authentic information regarding the crest height as observed in 1877 the approximate height has been determined as about 19 feet, referred to present gage datum. The corresponding discharge is about 275,000 second-feet. The crest height of the flood of March, 1912, is shown in Plate III.

Winter flow.—Ice sometimes forms to considerable thickness at this station.

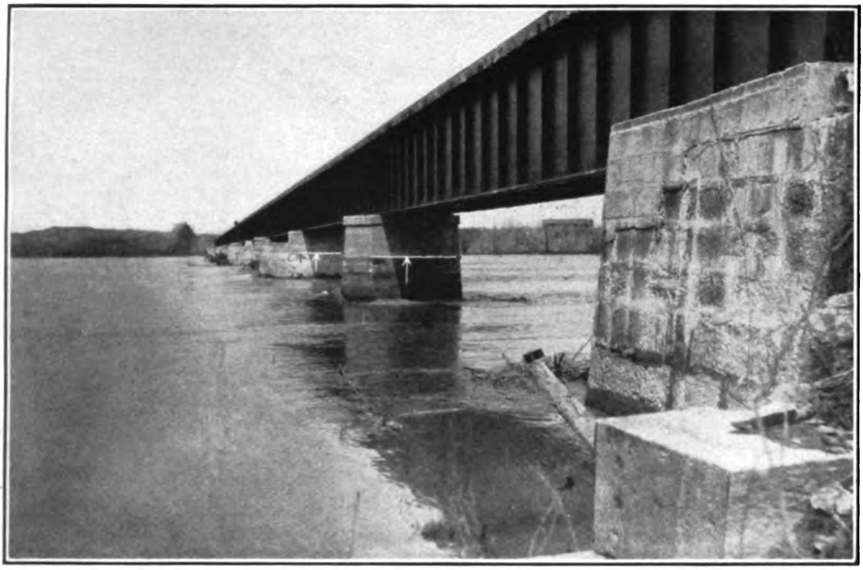
Artificial control.—It has been stated by those engaged in the operation of power plants at Roanoke Rapids and Weldon that a weekly trough has been noticed to occur on Tuesday or Wednesday during periods of low water. Such troughs have been said to be due probably to the weekly shut down of large power plants farther upstream.

Accuracy.—Gage observer considered reliable. The gage being situated about 1 mile from the lower end of a pool approximately 3 miles long, the station is not very sensitive. The left bank overflows in extreme floods but a fair determination can be made of the overflow discharge around the bridge.

Discharge measurements of Roanoke River at Old Gaston, N. C., in 1912.

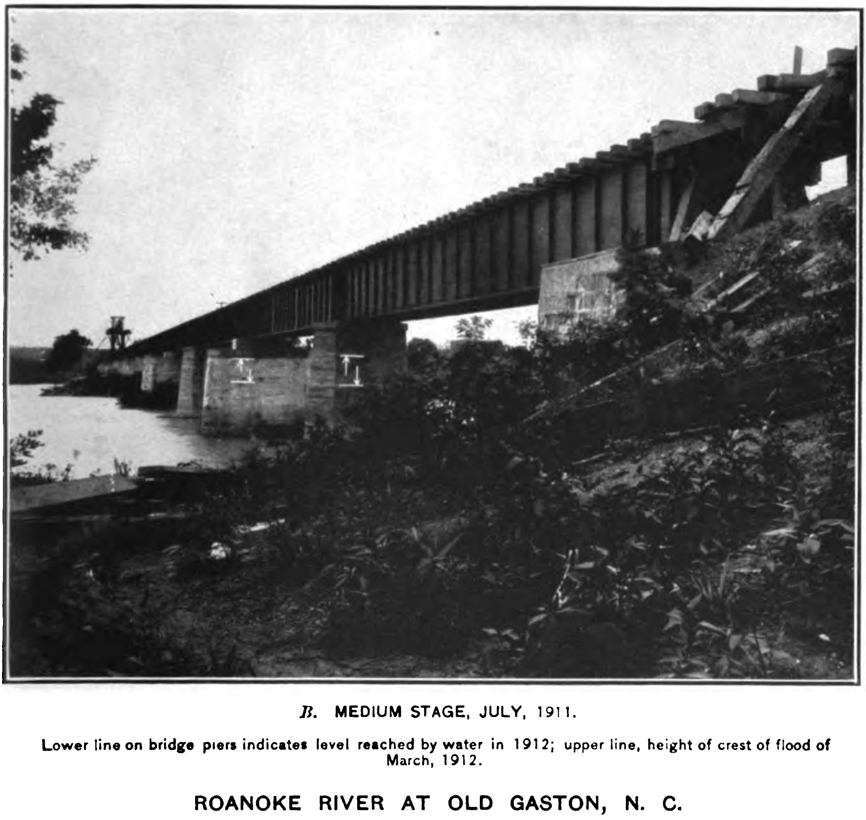
Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 24	H. J. Jackson	6.81	31,300	Mar. 19	H. J. Jackson	11.68	89,300
26	.....do	5.08	18,400	25	.....do	6.53	30,300
28	.....do	8.48	47,000	Aug. 25	L. J. Bevan[a]	1.42	1,940
Mar. 2	.....do	4.09	12,400	Nov. 18	Jackson and Batchelder	2.06	3,900
17	.....do	15.00	169,000				

[a] Engineer with Vielé, Blackwell and Buck.



A. FLOOD OF MARCH, 1912.

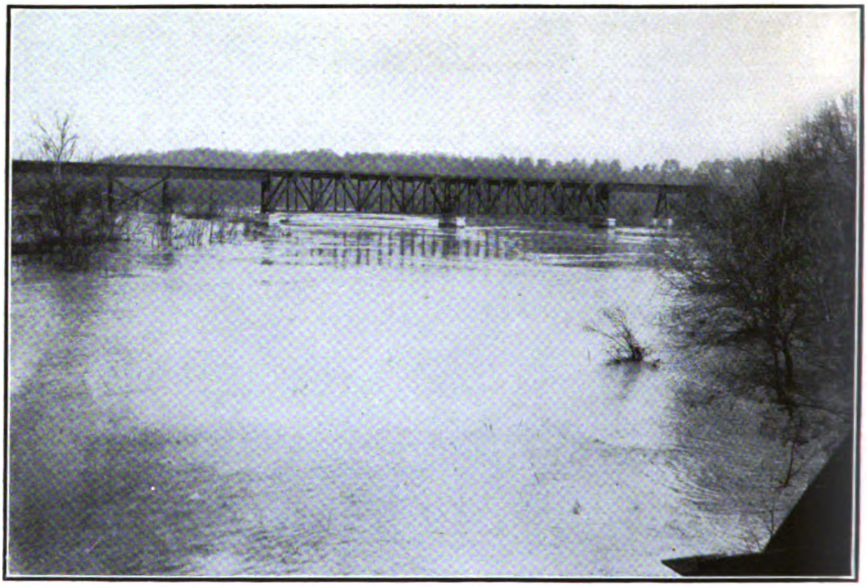
Horizontal line indicates height of crest of flood.



B. MEDIUM STAGE, JULY, 1911.

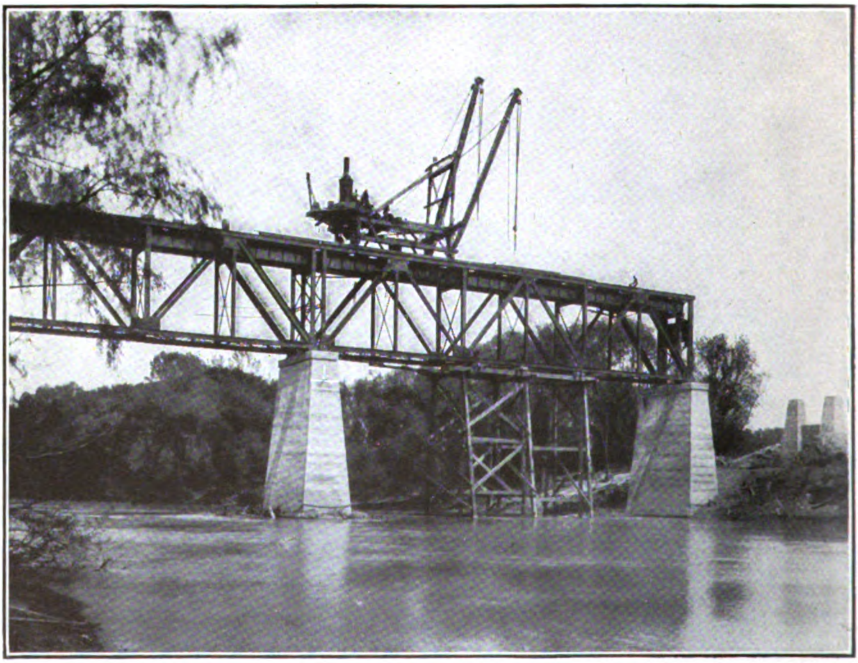
Lower line on bridge piers indicates level reached by water in 1912; upper line, height of crest of flood of March, 1912.

ROANOKE RIVER AT OLD GASTON, N. C.



A. FLOOD OF MARCH, 1912.

North channel looking upstream toward Atlantic Coast Line Railroad bridge.



B. MEDIUM STAGE, JULY, 1911.

Main channel from right bank, downstream side of Atlantic Coast Line Railroad bridge. Level reached by water in 1912 indicated by horizontal line and arrow on bridge pier.

ROANOKE RIVER AT WELDON, N. C.

Daily gage height, in feet, of Roanoke River at Old Gaston, N. C., for 1912.

[R. A. Howell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	5.4	5.6	10.45	4.05	2.45	3.75	1.65	1.4	1.95	1.7	1.75
2	3.9	4.4	4.3	5.6	3.85	2.55	3.75	1.9	1.25	1.95	1.6	1.75
3	3.8	3.4	3.75	4.85	3.45	2.45	4.75	1.5	1.15	1.75	1.7	1.75
4	3.6	3.4	3.5	4.75	3.15	2.55	3.75	1.5	1.15	1.75	1.65	1.65
5	3.5	2.5	3.25	4.35	2.9	2.25	3.2	1.45	.95	1.65	1.6	1.85
6	3.3	2.5	3.4	3.9	2.8	2.3	2.85	1.9	1.4	1.65	1.5	1.85
7	2.9	2.5	3.35	3.6	2.6	2.35	2.75	1.45	1.4	1.6	1.65	2.2
8	2.5	2.2	4.0	3.65	3.45	2.35	3.0	1.65	1.45	1.8	1.95	2.3
9	......	2.2	5.5	3.65	4.45	3.0	2.55	1.75	1.25	1.4	7.3	2.25
10	2.3	2.4	5.7	3.55	4.1	2.8	2.6	1.55	1.25	1.5	5.8	2.05
11	2.3	2.5	5.4	3.5	3.25	2.15	2.05	1.55	1.5	1.25	3.75	2.3
12	2.3	2.4	4.65	3.35	3.85	2.35	2.25	1.55	1.5	1.55	2.8	2.4
13	2.3	2.0	5.2	3.25	6.5	2.5	2.7	1.45	1.35	1.55	2.7	1.85
14	2.3	2.3	6.8	3.2	9.8	2.05	2.5	1.4	1.25	1.45	2.15	1.85
15	2.3	2.0	7.1	3.25	11.05	2.10	2.05	1.55	1.2	1.65	2.0	1.8
16	2.3	2.8	12.5	2.9	7.2	3.2	2.0	1.55	1.2	1.5	1.95	1.8
17	2.3	3.6	13.4	3.2	7.2	2.35	2.25	1.5	1.65	1.75	2.0	1.75
18	2.3	3.5	16.6	3.2	7.8	2.35	1.9	1.45	1.4	1.8	1.95	1.65
19	2.3	4.2	13.8	3.65	6.2	2.65	1.9	1.4	1.5	1.8	1.85	1.85
20	2.3	4.9	5.6	3.6	4.6	2.75	1.95	1.35	1.85	1.65	1.85	1.8
21	4.2	4.5	4.45	3.35	3.95	2.8	2.25	1.3	2.75	1.7	1.8	1.8
22	3.6	4.6	4.0	3.15	3.65	2.5	2.4	1.45	2.2	1.7	1.8	1.8
23	3.3	6.9	3.8	3.65	3.45	2.2	2.05	1.55	1.8	1.45	1.8	1.85
24	3.1	7.3	3.95	4.55	3.3	2.9	1.95	1.45	1.9	1.75	1.75	1.85
25	2.9	5.0	6.1	4.25	3.15	2.5	2.05	1.4	5.4	1.7	1.7	1.85
26	2.8	5.0	8.3	3.6	3.0	3.05	1.85	1.35	6.3	1.65	1.75	2.1
27	2.7	6.7	8.7	3.2	2.95	2.85	1.9	1.25	4.25	1.7	1.55	2.05
28	2.7	8.3	6.0	3.0	2.65	2.35	1.75	1.15	3.2	1.65	1.75	2.1
29	2.8	8.8	4.95	3.1	2.9	4.55	1.75	1.25	2.8	1.8	1.7	2.35
30	3.3	....	8.3	3.15	2.6	3.85	1.85	1.45	2.25	1.8	1.7	2.2
31	5.5	....	9.6	....	2.5	....	1.45	1.95	....	1.55	....	2.0

NOTE.—Relation of gage height to discharge probably affected by ice January 13–18.

Daily discharge, in second-feet, of Roanoke River at Old Gaston, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,040	20,700	22,100	68,700	[a]12,300	5,220	10,700	2,740	2,100	3,600	2,880	3,020
2	11,500	14,200	13,600	22,100	11,200	5,580	10,700	3,450	1,740	[a]3,600	2,610	3,020
3	[a]11,000	9,040	10,700	[a]16,900	9,270	5,220	[a]16,300	2,350	1,520	3,020	2,880	3,020
4	9,980	9,040	9,500	16,300	7,940	5,580	10,700	2,350	[a]1,520	3,020	2,740	[a]2,740
5	9,500	5,400	8,370	13,900	6,900	[a]4,540	8,150	2,220	1,100	2,740	2,610	3,300
6	8,590	5,400	[a]9,040	11,500	6,510	4,710	4,880	3,450	2,100	2,740	[a]2,350	3,300
7	6,900	[a]5,400	8,820	9,980	5,760	4,880	6,320	[a]2,220	2,100	2,610	2,740	4,380
8	5,400	4,380	12,000	10,200	[a]9,270	4,880	7,300	2,740	2,220	3,160	3,600	4,710
9	[b]5,050	4,380	21,400	10,200	14,500	7,300	5,580	3,020	1,740	[a]2,100	36,000	4,540
10	[a]4,710	5,050	22,800	[a]9,740	12,500	6,510	[a]5,760	2,480	1,740	2,350	23,600	3,900
11	4,710	5,400	20,700	9,500	8,370	4,220	3,900	2,480	[a]2,350	1,740	10,700	[a]4,710
12	4,710	5,050	15,700	8,820	11,200	[a]4,880	4,540	2,480	2,350	2,480	6,510	5,050
13	4,600	3,750	[a]19,300	8,370	29,000	5,400	6,130	2,220	1,980	2,480	[a]6,130	3,300
14	4,400	[a]4,710	31,500	8,150	60,800	3,900	5,400	[a]2,100	1,740	2,220	4,220	3,300
15	4,200	3,750	34,200	8,370	[a]78,000	4,060	3,900	2,480	1,630	2,740	3,750	3,160
16	4,100	6,510	106,000	6,900	35,100	8,150	3,750	2,480	1,630	[a]2,350	3,600	3,160
17	[a]4,000	9,980	127,000	[a]8,150	35,100	4,880	[a]4,540	2,350	2,740	3,020	3,750	3,020
18	4,400	9,500	210,000	8,150	40,600	4,880	3,450	2,220	[a]2,100	3,160	3,600	[a]2,740
19	4,710	13,100	137,000	10,200	26,600	[a]5,940	3,450	2,100	2,350	3,160	3,300	3,300
20	4,710	17,200	[a]22,100	9,980	15,400	6,320	3,600	1,980	3,300	2,740	[a]3,300	3,160
21	13,100	[a]14,800	14,500	8,820	11,700	6,510	4,540	[a]1,860	6,320	2,880	3,160	3,160
22	9,980	15,400	12,000	7,940	[a]10,200	5,400	5,050	2,220	4,380	2,880	3,160	3,160
23	8,590	32,400	11,000	10,200	9,270	4,380	3,900	2,480	3,160	[a]2,220	3,160	3,300
24	[a]7,720	36,000	11,700	[a]15,100	8,590	6,900	[a]3,600	2,220	3,450	3,020	3,020	3,300
25	6,900	17,900	25,900	13,400	7,940	5,400	3,900	2,100	[a]20,700	2,880	2,880	[a]3,300
26	6,510	17,900	45,400	9,980	7,300	[a]7,510	3,300	1,980	27,400	2,740	3,020	4,060
27	6,130	30,700	[a]49,300	8,150	7,100	6,700	3,450	1,740	13,400	2,880	[a]2,480	3,900
28	6,130	[a]45,400	25,100	7,300	5,940	4,880	3,020	[a]1,520	8,150	2,740	3,020	4,060
29	6,510	50,300	17,600	7,720	[a]6,900	15,100	3,020	1,740	6,510	3,160	2,880	4,880
30	8,590	....	45,400	7,940	5,760	11,200	3,300	2,220	4,540	[a]1,860	2,880	4,380
31	[a]21,400	....	58,600	....	5,400	....	[a]2,220	3,600	....	2,480	....	3,750

[a] Wednesday; see "artificial control."

[b] Interpolated.

NOTE.—Daily discharge computed from a rating curve well defined between 1,900 and 33,300 second-feet, and fairly well defined between 34,200 and 181,000 second-feet. Above 194,000 second-feet the rating curve is assumed a tangent. Discharge estimated January 13–18 because of ice.

Monthly discharge of Roanoke River at Old Gaston, N. C., for 1912.

[Drainage area, 8,350 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	21,400	[a] 4,000	7,350	0.880	1.01	B.
February	50,300	3,750	14,600	1.75	1.89	A.
March	210,000	8,370	38,000	4.55	5.25	A.
April	68,700	6,900	12,400	1.49	1.66	A.
May	78,000	5,400	16,900	2.02	2.33	A.
June	15,100	3,900	6,030	.722	.81	A.
July	16,300	2,220	5,430	.650	.75	A.
August	3,600	1,520	2,370	.284	.33	A.
September	27,400	1,100	4,600	.551	.61	A.
October	3,600	1,740	2,730	.327	.38	A.
November	36,000	2,350	5,350	.641	.72	A.
December	5,050	2,740	3,620	.434	.50	A.
The year	210,000	1,100	9,950	1.19	16.24	

[a] Ice estimate.

ROANOKE RIVER AT WELDON, N. C.

General statement.—The Geological Survey entered into a study of this United States Weather Bureau station to ascertain whether or not a record of discharge could be obtained from the gage record for back years. The gaging station at Old Gaston, about 13 miles above Weldon, was established for comparative purposes. It has been found, upon brief study, that the Weldon gage record can not be utilized for discharge purposes without a disproportionate expenditure of funds—if at all. The study therefore has been abandoned and the base data and information obtained are published herewith.

Location.—At Seaboard Air Line Railway bridge, just north of Weldon, N. C., about 1 mile below mouth of Chockyott Creek and about 500 yards above the lower end of the "fall line."

Records available.—Gage heights November 1, 1890, to December 31, 1912, in the publications of the United States Weather Bureau. The following corrections are necessary to the published records: December 13 to 31, 1907, and June 1 to 30, 1908, subtract 4.0 feet, and January 1 to May 31, 1908, subtract 2.0 feet from the printed records. (See "Discharge measurements.")

Drainage area.—8,420 square miles.

Gage.—Property of the United States Weather Bureau, by which records are kept. The present gage is a chain gage attached to upstream guard timber in center panel of second through span from south end of bridge. The original gage is said to have been a staff gage in two sections, attached to a rock out in the channel and a tree on the right bank about 400 or 500 yards below the Seaboard Air Line Bridge. The zero of this gage is said to have been set at about low water, which was taken as the bottom of a hole in a large rock, familiarly known in the locality as "Cuba" rock. The first gage observer here was a Mr. Clark, and upon his death no record was kept for a time. A new gage, of the Missouri River wire-cable type, was installed by the present observer, Mr. H. D. Allen, on April 1, 1899. It was intended that this should read the same as the old gage, but the chain length and datum to which it was set are in question. This gage was just above the second rock pier from the south end of the bridge. In December, 1907, the gage was destroyed and was replaced on December 13, 1907, by a chain gage. It is questionable whether or not there was a change between 1899 and 1907.

It was later discovered that this chain was 2 feet too long, and consequently on July 1, 1908, the new chain was shortened 2 feet. This chain was cut off on May 15, 1910, and a new chain, the present one, installed on May 25, 1910. During September or October, 1911, this gage was moved two bridge panels farther out into the river to its present location. On December 9, 1911, the chain length was found to be 67.60 feet (elongation probably due to stretch since installation) and was changed to the correct length, 66.30 feet. With the chain length correct the gage was found to read 0.60 foot low, by wye levels from the bench mark on the Bank of Weldon Building. (Elevation 64.20 feet above zero of gage.) See United States Weather Bureau publication "Daily river stages, principal rivers of the United States, Part X."

Channel.—Sand, gravel, and small rocks. Probably shifting, especially at high stages.

Discharge measurements.—Made from the foot walk on downstream side of Seaboard Air Line Railway bridge. Eleven discharge measurements were made at this station in 1911 and 1912 by the United States Geological Survey. (See table, p. 28.) Measurements Nos. 6 to 11 were made during the flood of March, 1912. If the Weldon measurements are plotted on cross section paper (gage heights in feet as ordinates, scale 4 feet to the inch, and discharge in second-feet as abscissas, scale 10,000 second-feet to the inch), it will be seen that a smooth curve can be drawn among the points representing measurements Nos. 1, 2, 3, 5, 6, and 7. This will be an approximate "free flow" or rising stage discharge curve for the March, 1912, flood at Weldon. Another smooth curve can be drawn among the points representing measurements Nos. 1, 7, 8, 9, 10, and 11, and this will be a probable "backwater" or "falling stage" discharge curve for the March, 1912, flood at Weldon. Measurement No. 4, made at the crest of the February, 1912, rise, will be found to be midway between the two curves. These curves may be used to determine the discharge at Weldon during the March, 1912, flood, using the curves over the proper periods of rising and falling stage as indicated by the measurements. The relation of gage height to discharge indicated by these curves, however, is probably not applicable to other periods and engineers making use of these data for discharge purposes should do so with caution. The discharge measurements at Old Gaston, made during the same periods (see p. 25), will be found to plot on a smooth curve, but the Survey has made no comparative study of these data.

Floods.—The United States Weather Bureau publishes the maximum stage at Weldon as 60.3 feet, November 26, 1877, but from information obtained at Weldon in March, 1912, it seems probable that this value is about 7 feet too high—namely, the 1877 flood reached a crest height of about 53 feet, referred to the present gage datum. The flood of March, 1912, reached a crest height of 50.3 feet (discharge about 162,000 second-feet) at 4.30 p. m. March 18, about 3 feet lower than the 1877 flood. Plate IV, *A*, shows Roanoke River at Weldon during the flood of March, 1912 (gage height 47.9 feet, discharge about 120,000 second-feet), and Plate IV, *B*, a comparative view taken at medium low water. The horizontal lines and arrows on the piers show the crest height (gage height 50.3 feet) and the height at the time of the flood photograph.

Regulation.—The Roanoke Rapids Power Co. has a series of low dams or wing walls that divert water from the river above Roanoke Rapids, about 8 miles above Weldon. It is probable that they cause little pondage. Officials of power companies at Roanoke Rapids and Weldon state that during seasons of low water they have noticed low periods about Tuesday evening or Wednesday morning each week, which they ascribe to the ponding of water from Saturday night to Monday morning by the power plants at Danville.

Diversions.—The Roanoke Navigation & Water Power Co. diverts water from the river at Shaws Island, about 9 miles above Weldon. This company's canal is said to carry from 150 to 300 second-feet, with an average of about 250 second-feet. This water passes around the gaging section at Weldon, the outlet of the canal being about 200 yards below the bridge to which the gage is attached. Flow in the canal is included in the discharge given in the table of discharge measurements.

Accuracy.—The discharge measurements are accurate and reliable. The accuracy of the gage-height records for discharge purposes will best be determined by a detailed study of the data.

Cooperation.—The work of the Survey at this station was done in cooperation with the Virginia-Carolina Power Co., William C. Whitner, president.

Discharge measurements of Roanoke River at Weldon, N. C., in 1911–12.

[Hydrographer, H. J. Jackson.]

No.	Date.	Gage height.	Discharge.	Gage height change.	No.	Date.	Gage height.	Discharge.	Gage height change.
	1911.	*Feet.*	*Sec.-ft.*			1912.	*Feet.*	*Sec.-ft.*	
1	Dec. 10	10.56	3,440	Rising.	6	Mar. 17	43.12	98,800	Rising.
					7	18	49.98	158,000	Rising (crest).
	1912.				8	19	48.22	123,000	Falling.
2	Feb. 25	23.88	19,700	Falling.	9	20	36.79	26,600	Do.
3	27	29.16	37,600	Rising.	10	20	35.20	27,000	Do.
4	29	35.05	44,900	Crest.	11	21	28.25	15,600	Do.
5	Mar. 4	16.07	10,200	Falling.					

YADKIN OR PEEDEE RIVER BASIN.

YADKIN RIVER NEAR SALISBURY, N. C.

Location.—At the highway bridge known as the Piedmont Toll Bridge, 1,000 feet above the Southern Railway bridge, 6 miles east of Salisbury, and about 5 miles below the mouth of South Yadkin River.

Records available.—September 24, 1895, to December 31, 1909; September 1, 1911, to December 31, 1912.

Drainage area.—3,400 square miles.

Gage.—Standard chain gage attached to the highway bridge. From the date of establishment to May 31, 1899, the gage was at the Southern Railway bridge, and from the latter date it was at the highway bridge until moved back to the railroad bridge early in the year 1903, where it remained until the end of the year 1905. Since January 1, 1906, the gage has been at the highway bridge on the same datum as originally established there in 1899. The last gage at the railroad bridge read the same as the gage at the highway bridge at gage height 3.2 feet but was not the same for higher and lower stages. There is some uncertainty as to the datum of the original gage at the railroad bridge.

Channel.—Practically permanent; wide and rather rough.

Discharge measurements.—Made from the highway bridge. During the time that the gage was at the railroad bridge most of the measurements were made from that bridge.

Winter flow.—Ice or snow have little if any effect on the records of the station.

Artificial control.—There are some developed powers on the river and tributaries above which may slightly affect the flow.

The following discharge measurement was made by W. E. Hall:

October 28, 1912, gage height, 2.22 feet; discharge, 2,240 second-feet.

Daily gage height, in feet, of Yadkin River near Salisbury, N. C., for 1912.

[J. T. Yarbrough, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	3.4	3.4	4.1	3.5	2.7	2.6	2.3	2.0	2.4	2.1	2.2
2	3.5	2.9	3.1	4.5	3.0	2.6	2.55	2.3	1.95	2.4	2.1	2.2
3	3.2	2.6	3.0	5.0	2.95	2.7	2.6	2.15	1.9	2.3	2.3	2.3
4	3.0	2.5	2.9	4.0	2.85	2.6	2.6	2.2	1.85	2.25	2.3	2.2
5	3.0	2.35	3.1	3.5	2.7	2.7	3.1	2.5	1.85	2.15	2.1	2.3
6	2.6	2.25	3.3	3.3	2.9	2.7	4.9	2.35	1.85	2.2	2.2	2.45
7	2.55	2.35	3.6	3.3	3.5	2.9	4.2	2.2	1.9	2.2	2.3	2.5
8	2.6	2.4	4.3	3.3	3.5	3.0	3.0	2.1	2.3	2.1	5.1	2.5
9	2.5	2.45	4.7	3.1	3.0	2.7	2.8	2.2	2.5	2.1	4.0	2.4
10	2.6	2.4	4.1	3.0	2.75	2.55	2.9	2.15	2.1	2.05	3.0	2.2
11	2.65	2.25	3.7	3.0	3.1	2.65	3.1	2.4	2.0	2.1	2.7	2.25
12	2.6	2.35	3.3	2.9	7.5	2.45	3.0	2.35	1.9	2.0	2.5	2.2
13	2.6	2.25	3.5	3.0	12.6	2.5	3.1	2.15	2.0	2.0	2.45	2.2
14	2.2	2.25	3.7	2.8	9.3	2.55	3.0	2.1	3.4	2.25	2.4	2.1
15	2.15	2.4	9.9	2.8	4.3	3.0	2.9	2.1	3.1	2.5	2.35	2.15
16	2.25	4.1	19.0	2.9	4.5	3.2	3.0	2.15	3.1	2.6	2.3	2.25
17	2.15	3.8	13.5	3.5	5.3	3.0	2.8	2.2	2.7	2.35	2.3	2.2
18	2.2	3.4	5.9	3.5	4.2	2.8	2.7	2.1	2.1	2.15	2.3	2.2
19	2.65	3.0	4.2	3.3	3.5	2.75	2.7	2.25	2.05	2.2	2.25	2.2
20	2.85	2.85	3.7	2.9	3.3	2.6	3.1	2.2	2.1	2.3	2.25	2.3
21	2.75	2.95	3.5	2.9	3.2	2.55	3.5	2.1	2.2	2.35	2.3	2.2
22	2.55	6.1	3.2	3.8	3.0	2.3	3.5	2.05	2.0	2.2	2.2	2.2
23	2.45	5.6	3.2	5.5	3.0	2.45	3.0	2.0	2.4	2.2	2.2	2.2
24	2.4	3.9	3.5	4.5	2.85	2.65	2.65	1.95	7.3	2.35	2.2	2.25
25	2.4	3.8	4.9	3.3	2.8	2.8	2.5	1.9	6.6	2.3	2.3	2.3
26	2.35	4.1	4.3	2.9	2.8	2.5	2.4	2.2	4.7	2.15	2.2	2.3
27	2.3	5.8	3.6	3.0	2.85	2.8	2.45	2.7	3.1	2.15	2.15	2.3
28	2.35	5.2	3.3	3.0	2.7	3.2	2.2	2.55	2.85	2.15	2.2	2.25
29	2.3	4.0	4.5	3.0	2.7	2.9	2.25	2.1	2.75	2.1	2.2	2.3
30	3.8	......	7.9	3.5	2.8	2.6	2.15	2.05	2.55	2.1	2.2	2.3
31	3.9	......	5.2	......	2.8	......	2.4	2.0	......	2.1	......	2.3

Daily discharge, in second-feet, of Yadkin River near Salisbury, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,460	5,740	5,740	8,370	6,100	3,500	3,210	2,410	1,730	2,660	1,940	2,170
2	6,100	4,090	4,720	9,990	4,400	3,210	3,070	2,410	1,630	2,660	1,940	2,170
3	5,050	3,210	4,400	12,200	4,240	3,500	3,210	2,060	1,530	2,410	2,410	2,410
4	4,400	2,930	4,090	7,980	3,940	3,210	3,210	2,170	1,440	2,290	2,410	2,170
5	4,400	2,540	4,720	6,100	3,500	3,500	4,720	2,930	1,440	2,060	1,940	2,410
6	3,210	2,290	5,390	5,390	4,090	3,500	11,700	2,540	1,440	2,170	2,170	2,800
7	3,070	2,540	6,460	5,390	6,100	4,090	8,770	2,170	1,530	2,170	2,410	2,930
8	3,210	2,660	9,170	5,390	6,100	4,400	4,400	1,940	2,410	1,940	12,600	2,930
9	2,930	2,800	10,800	4,720	4,400	3,500	3,790	2,170	2,930	1,940	7,980	2,660
10	3,210	2,660	8,370	4,400	3,640	3,070	4,090	2,060	1,940	1,840	4,400	2,170
11	3,360	2,290	6,830	4,400	4,720	3,360	4,720	2,660	1,730	1,940	3,500	2,290
12	3,210	2,540	5,390	4,090	24,300	2,800	4,400	2,540	1,530	1,730	2,930	2,170
13	3,210	2,290	6,100	4,400	57,200	2,930	4,720	2,060	1,730	1,730	2,800	2,170
14	2,170	2,290	6,830	3,790	34,700	3,070	4,400	1,940	5,740	2,290	2,660	1,940
15	2,060	2,660	38,600	3,790	9,170	4,400	4,090	1,940	4,720	2,930	2,540	2,060
16	2,290	8,370	103,000	4,090	9,990	5,050	4,400	2,060	4,720	3,210	2,410	2,290
17	2,060	7,210	63,600	6,100	13,500	4,400	3,790	2,170	3,500	2,540	2,410	2,170
18	2,170	5,740	16,300	6,100	8,770	3,790	3,500	1,940	1,940	2,060	2,410	2,170
19	3,360	4,400	8,770	5,390	6,100	3,640	3,500	2,290	1,840	2,170	2,290	2,170
20	3,940	3,940	6,830	4,090	5,390	3,210	4,720	2,170	1,940	2,410	2,290	2,410
21	3,640	4,240	6,100	4,090	5,050	3,070	6,100	1,940	2,170	2,540	2,410	2,170
22	3,070	17,200	5,050	7,210	4,400	2,410	6,100	1,840	1,730	2,170	2,170	2,170
23	2,800	14,900	5,050	14,400	4,400	2,800	4,400	1,730	2,660	2,170	2,170	2,170
24	2,660	7,590	6,100	9,990	3,940	3,360	3,360	1,630	23,200	2,540	2,170	2,290
25	2,660	7,210	11,700	5,390	3,790	3,790	2,930	1,530	19,700	2,410	2,410	2,410
26	2,540	8,370	9,170	4,090	3,790	2,930	2,660	2,170	10,800	2,060	2,170	2,410
27	2,410	15,800	6,460	4,400	3,940	3,790	2,800	3,500	4,720	2,060	2,060	2,410
28	2,540	13,000	5,390	4,400	3,500	5,050	2,170	3,070	3,940	2,060	2,170	2,290
29	2,410	7,980	9,990	4,400	3,500	4,090	2,290	1,940	3,640	1,940	2,170	2,410
30	7,210	......	26,400	6,100	3,790	3,210	2,060	1,840	3,070	1,940	2,170	2,410
31	7,590	......	13,000	......	3,790	......	2,660	1,730	......	1,940	......	2,410

NOTE.—Daily discharge computed from a rating curve fairly well defined below 21,700 second-feet.

Monthly discharge of Yadkin River near Salisbury, N. C., for 1912.

[Drainage area, 3,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	7,590	2,060	3,530	1.04	1.20	A.
February	17,200	2,290	5,840	1.72	1.86	B.
March	103,000	4,090	13,900	4.09	4.72	B.
April	14,400	3,790	6,020	1.77	1.98	B.
May	57,200	3,500	8,520	2.51	2.89	B.
June	5,050	2,410	3,550	1.04	1.16	A.
July	11,700	2,060	4,190	1.23	1.42	A.
August	3,500	1,530	2,180	.641	.74	A.
September	23,200	1,440	4,100	1.21	1.35	B.
October	3,210	1,730	2,230	.656	.76	A.
November	12,600	1,940	2,950	.868	.97	A.
December	2,930	1,940	2,330	.685	.79	A.
The year	103,000	1,440	4,950	1.46	19.84	

YADKIN RIVER NEAR PEEDEE, N. C.

Location.—At a private ferry about 1,500 feet below the dam of the Rockingham Power Co., half a mile below the mouth of Smith Creek and 1 mile above Partridge Creek.

Records available.—August 9, 1906, to January 21, 1912.

Drainage area.—Not measured.

Gage.—Vertical timber gage on right bank above the ferry landing.

Channel.—Wide, with rough bed, mostly rock, some of which projects from surface at low water. Current irregular.

Discharge measurements.—Made from the ferry boat.

Artificial control.—The large power plant of the Rockingham Power Co., just above the station, was put into operation January 21, 1912, The tailrace of the plant empties into the river below the gage, so there is no flow past the gage at times when this plant is using all the flow of the river. There had not been much artificial regulation of the flow previous to January 21, 1912.

Accuracy.—Owing to diurnal flictuations caused by the operations of the power plant above the station (see artificial control), two gage-height readings a day are not considered sufficient data upon which to base estimates of daily discharge subsequent to January 21, 1912. No discharge measurements were made at this station during 1912.

Cooperation.—All gage heights have been furnished by the engineers of the Rockingham Power Co.

Daily gage height, in feet, and discharge, in second-feet, of Yadkin River near Peedee, N. C., for 1912.

[W. S. Ide, observer.]

Day.	January.		Day.	January.	
	Gage. height.	Discharge.		Gage height.	Discharge.
1	89.6	8,350	11	89.6	8,350
2	90.8	11,500	12	89.7	8,600
3	90.2	9,900	13	89.8	8,860
4	90.1	9,640	14	89.2	7,360
5	90.2	9,900	15	88.6	5,930
6	89.6	8,350	16	88.8	6,400
7	89.0	6,880	17	88.1	4,790
8	88.6	5,930	18	88.5	5,700
9	89.2	7,360	19	96.2	....
10	89.7	8,600	20	120.2	....
			21	86.6	....

NOTE.—Daily discharge computed from a rating curve fairly well defined between 2,700 and 13,400 second-feet. Below 2,500 and above 15,000 second-feet the rating is very uncertain and daily discharge has not been computed.

PEEDEE RIVER AT CHERAW, S. C.

Location.—At the highway bridge in Cheraw, S. C., below the bridge of the Seaboard Air Line Railway.

Records available.—April 1, 1891, to August 27, 1908; November 2, 1909, to December 31, 1912.

Drainage area.—6,670 square miles.

Gage.—Vertical timber attached to bridge pier. The original gage and the bridge to which it was attached were washed away August 27, 1908. The rating for recent years would probably not apply to these old gage heights, and it is not certain that the new gage is set on the same datum as the former gage.

Discharge measurements.—Made from the highway bridge to which the gage is attached. Some measurements have been made at the Seaboard Air Line Railway bridge, one-half mile above.

Artificial control.—Large Power plants at Rockingham, N. C., and at Whitney, N. C., put into operation early in 1912, seriously affect the flow at this station.

Accuracy.—Estimates are based upon one gage-height reading a day and may be conconsiderably in error at low stages owing to diurnal fluctuations caused by the operation of power plants above. The 1912 estimate is based on the 1911 rating, which is not developed for high stages. No discharge measurements were made at this station during 1912.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Daily gage height, in feet, of Peedee River at Cheraw, S. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.4	18.6	16.5	21.8	7.9	3.3	4.8	2.0	2.1	4.1	1.4	2.0
2	7.2	11.8	12.3	16.6	8.1	4.0	4.1	2.0	1.9	3.9	1.4	1.8
3	9.6	8.3	8.8	11.2	6.2	3.9	4.8	2.3	1.8	3.2	1.6	1.8
4	10.2	6.4	8.9	15.2	5.7	3.8	4.1	2.2	1.7	2.9	1.6	1.8
5	8.8	5.2	10.8	15.4	5.4	4.8	3.5	2.1	1.6	2.7	1.6	1.7
6	9.1	4.8	12.6	13.5	5.1	8.6	3.3	2.1	1.6	2.5	1.5	1.7
7	6.2	4.4	22.4	9.0	5.1	10.0	6.3	2.0	1.8	2.3	1.5	1.6
8	5.0	3.9	21.5	7.6	15.2	11.7	9.8	1.9	1.7	2.1	8.2	1.6
9	6.1	3.2	17.3	6.5	12.3	10.2	6.5	2.1	1.6	2.0	17.4	1.6
10	8.4	2.9	22.0	7.2	8.5	8.1	4.7	2.4	1.6	1.9	13.2	1.8
11	9.1	3.0	18.3	6.9	6.9	6.2	4.9	2.2	1.8	1.9	9.0	1.7
12	8.4	3.6	15.0	6.2	5.8	4.2	5.2	2.1	2.8	1.9	6.2	1.7
13	7.0	3.2	15.3	5.7	10.2	3.9	7.5	2.0	3.1	1.8	4.6	1.6
14	6.6	3.1	17.7	5.6	25.2	3.5	7.4	2.0	2.8	1.7	2.9	1.6
15	6.6	3.6	13.2	5.6	29.1	23.5	6.8	1.9	2.6	1.7	2.1	1.6
16	6.2	28.3	32.4	5.6	23.2	25.7	5.2	2.2	2.5	1.9	1.8	1.5
17	4.9	33.7	39.2	5.4	18.8	16.8	4.5	3.0	2.3	1.9	1.7	1.5
18	4.2	29.2	38.4	5.6	17.3	9.6	4.8	2.8	4.1	1.7	1.6	1.5
19	4.0	23.4	33.2	6.1	14.2	6.2	5.1	2.6	2.9	1.6	1.6	1.8
20	4.8	18.6	25.6	8.5	9.8	4.6	4.4	3.1	2.6	1.6	1.6	1.8
21	3.6	14.2	18.8	6.3	7.6	4.1	7.0	2.9	2.5	1.9	1.5	1.7
22	2.8	17.6	14.3	6.0	5.8	3.9	10.4	3.1	2.4	2.1	1.5	1.7
23	2.2	25.3	11.0	21.5	5.3	3.7	10.8	2.9	2.3	1.9	1.5	1.6
24	5.1	23.6	10.3	28.1	4.8	3.5	8.2	2.7	3.0	1.8	1.4	2.0
25	4.7	18.0	13.0	22.4	4.5	3.3	5.9	2.5	11.5	1.8	1.4	2.4
26	3.9	16.5	14.6	14.6	4.2	3.2	4.6	2.5	18.8	1.7	1.3	2.1
27	4.1	20.1	13.8	9.1	4.5	3.1	4.1	3.4	15.1	1.6	1.3	2.1
28	3.8	24.8	10.8	7.0	4.1	3.8	3.4	3.2	8.6	1.6	1.3	2.8
29	3.6	22.1	9.0	6.2	4.0	4.1	3.0	3.1	6.4	1.5	1.5	3.0
30	3.6	....	22.0	6.2	3.8	5.0	2.6	2.8	4.9	1.5	1.8	2.8
31	22.3	....	26.1	....	3.5	....	2.3	2.5	....	1.5	....	3.1

Daily discharge, in second-feet, of Peedee River at Cheraw, S. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7,120	....	....	....	10,600	4,630	6,360	3,300	3,390	5,520	2,760	3,300
2	9,600	17,400	....	....	11,000	5,400	5,520	3,300	3,210	5,290	2,760	3,120
3	13,400	11,300	12,100	16,300	8,180	5,290	6,360	3,580	3,120	4,520	2,940	3,120
4	14,500	8,460	12,200	....	7,510	5,180	5,520	3,480	3,030	4,190	2,940	3,120
5	12,100	6,860	15,500	....	7,120	6,360	4,850	3,390	2,940	3,980	2,940	3,030
6	12,600	6,360	....	....	6,730	11,800	4,630	3,390	2,940	3,780	2,850	3,030
7	8,180	5,580	....	12,400	6,730	14,100	8,320	3,300	3,120	3,580	2,850	2,940
9	6,660	5,290	....	10,200	....	17,200	13,800	3,210	3,030	3,390	11,100	2,940
9	8,040	4,520	....	8,600	....	14,500	8,600	3,390	2,940	3,300	....	2,940
10	11,400	4,190	....	9,600	11,600	11,000	6,240	3,680	2,940	3,210	....	3,120
11	12,600	4,300	....	9,160	9,160	8,180	6,480	3,480	3,120	3,210	12,400	3,030
12	11,400	4,960	....	8,180	7,640	5,640	6,860	3,390	4,080	3,210	8,180	3,030
13	9,300	4,520	....	7,510	14,500	5,290	10,000	3,300	4,410	3,120	6,120	2,940
14	8,740	4,410	....	7,380	....	4,850	9,900	3,300	4,080	3,030	4,190	2,940
15	8,740	4,960	....	7,380	....	....	9,020	3,210	3,880	3,030	3,390	2,940
16	8,180	....	....	7,380	....	....	6,860	3,480	3,780	3,210	3,120	2,850
17	6,480	....	....	7,120	....	....	6,000	4,300	3,580	3,210	3,030	2,850
18	5,640	....	....	7,380	....	13,400	6,360	4,080	5,520	3,030	2,940	2,850
19	5,400	....	....	8,040	....	8,180	6,730	3,880	4,190	2,940	2,940	3,120
20	6,360	....	....	11,600	13,800	6,120	5,880	4,410	3,880	2,940	2,940	3,120
21	4,960	....	....	8,320	10,200	5,520	9,300	4,190	3,780	3,210	2,850	3,030
22	4,080	....	....	7,900	7,640	5,290	14,800	4,410	3,680	3,390	2,850	3,030
23	3,480	....	15,900	....	6,990	5,070	15,500	4,190	3,580	3,210	2,850	2,940
24	6,730	....	14,600	....	6,360	4,850	11,100	3,980	4,300	3,120	2,760	3,300
25	6,240	....	....	....	6,000	4,630	7,770	3,780	16,800	3,120	2,760	3,680
26	5,290	....	....	....	5,640	4,520	6,120	3,780	....	3,030	2,680	3,390
27	5,520	....	....	12,600	6,000	4,410	5,520	4,740	....	2,940	2,680	3,390
28	5,180	....	15,500	9,300	5,520	5,180	4,740	4,520	11,800	2,940	2,680	4,080
29	4,960	....	12,400	8,180	5,400	5,520	4,300	4,410	8,460	2,850	2,850	4,300
30	4,960	....	....	8,180	5,180	6,600	3,880	4,080	6,480	2,850	3,120	4,080
31	....	....	....	....	4,850	....	3,580	3,780	....	2,850	....	4,410

NOTE.—Daily discharge determined from a rating curve fairly well defined between 3,000 and 14,900 second-feet. The discharge was greater than 18,000 second-feet on days for which no estimates are given.

SAVANNAH RIVER BASIN.

TALLULAH RIVER AT TALLULAH FALLS, GA.

Location.—At the wagon bridge at Tallulah Falls, about one-fourth mile above the beginning of the falls proper, and 3½ miles above the junction of Tallulah and Chattooga rivers. No important streams flow into Tallulah River below the station.

Records available.—August 29 to October 19, 1900; January 18 to December 31, 1901; July 15, 1904, to September 30, 1912.

Drainage area.—191 square miles.

Gage.—Standard chain gage attached to the bridge; datum same as that of the original vertical gage.

Channel.—Rocky, rather deep; slow current at low stages, becoming very swift at high stages. Some change of rating has occurred, probably caused by bowlders lodging on or washing away from the shallow, rocky crest a short distance below.

Discharge measurements.—Made from the upstream side of the wagon bridge.

Artificial control.—The dam of the Georgia Railway & Power Co. at Tallulah Falls, about 1,000 feet below the station, was constructed during 1912. Backwater from this dam reached the gage about October 1, 1912, necessitating the abandonment of the station.

Accuracy.—For flood stages above gage height 6 feet the rating is not well developed.

Discharge measurements of Tallulah River at Tallulah Falls, Ga., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 9	W. E. Hall	2.45	845
10	.....do	2.37	784

Daily gage height, in feet, of Tallulah River at Tallulah Falls, Ga., for 1912.

[Wiley Pitts, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.6	2.2	2.6	3.4	2.8	2.0	2.0	2.2	1.4
2	2.4	2.1	2.4	3.2	2.7	1.95	2.1	1.95	1.3
3	2.4	2.1	2.4	3.0	2.7	2.0	2.9	1.9	1.3
4	2.2	2.0	2.4	2.9	2.7	2.0	2.6	2.9	1.35
5	2.0	1.8	2.4	2.8	2.6	1.95	3.2	2.0	1.4
6	2.0	1.8	2.7	2.8	2.6	2.2	3.6	1.95	1.4
7	1.9	1.8	2.5	2.8	2.8	2.2	2.9	1.9	1.3
8	2.0	1.8	2.4	2.7	2.6	2.0	2.6	1.9	1.3
9	2.2	1.8	2.5	2.6	2.4	1.9	2.6	2.1	1.2
10	2.0	1.8	2.3	2.6	2.4	1.8	2.6	2.1	1.2
11	1.9	1.75	2.3	2.6	2.4	1.8	3.0	2.0	1.45
12	1.9	1.7	2.4	2.5	2.4	1.75	2.6	1.9	1.35
13	1.9	1.7	2.3	2.5	2.2	1.7	2.4	1.85	1.25
14	1.8	1.75	2.3	2.5	2.2	2.9	2.4	1.8	1.3
15	1.7	3.6	6.1	2.5	2.2	2.8	2.3	1.85	4.0
16	1.6	2.7	3.6	2.6	2.4	2.5	2.4	1.8	2.3
17	1.6	2.4	3.2	2.8	2.4	2.1	2.6	1.8	1.7
18	1.7	2.4	2.9	2.7	2.2	1.95	2.6	1.95	1.4
19	2.2	2.3	2.8	2.6	2.2	1.85	3.2	1.8	1.35
20	1.9	2.3	2.7	2.5	2.2	1.8	2.6	1.7	1.3
21	1.8	3.6	2.6	2.5	2.2	1.7	2.9	1.65	1.25
22	1.7	3.1	2.5	2.6	2.1	1.7	2.6	2.0	1.6
23	1.7	2.6	2.6	3.1	2.1	1.6	2.8	1.8	6.0
24	1.7	2.7	3.9	2.8	2.1	1.9	2.6	1.65	2.7
25	1.65	2.7	3.1	2.6	2.0	2.8	2.4	1.6	2.0
26	1.6	3.7	2.8	2.5	2.0	2.4	2.2	1.65	1.8
27	1.6	3.4	2.7	2.8	2.2	2.4	2.2	1.6	1.85
28	1.6	3.0	2.7	2.7	2.2	2.2	2.0	1.5	2.3
29	3.7	2.8	6.0	2.9	3.2	2.5	2.0	1.45	1.85
30	3.1	....	3.8	3.0	2.4	2.2	2.0	1.5	1.7
31	2.4	....	3.4	....	2.2	....	1.95	1.45	....

Daily discharge, in second-feet, of Tallulah River at Tallulah Falls, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	910	700	910	1,520	1,080	610	610	700	365
2	800	655	800	1,330	970	588	655	588	330
3	800	655	800	1,170	970	610	1,100	565	330
4	700	610	800	1,100	970	610	910	1,100	348
5	610	520	800	1,030	910	588	1,330	610	365
6	610	520	970	1,080	910	700	1,730	588	365
7	565	520	850	1,030	1,030	700	1,100	565	330
8	610	520	800	970	910	610	910	565	330
9	700	520	850	910	800	565	910	655	295
10	610	520	750	910	800	520	910	655	295
11	565	500	750	910	800	520	1,170	610	382
12	565	480	800	850	800	500	910	565	348
13	565	480	750	850	700	480	800	542	312
14	520	500	750	850	700	1,100	800	520	330
15	480	1,730	5,230	850	700	1,030	750	542	2,200
16	440	970	1,730	910	800	850	800	520	750
17	440	800	1,330	1,030	800	655	910	520	480
18	480	800	1,100	970	700	588	910	588	365
19	700	750	1,030	910	700	542	1,330	520	348
20	565	750	970	850	700	520	910	480	330
21	520	1,730	910	850	700	480	1,100	460	312
22	480	1,250	850	910	655	480	910	610	440
23	480	910	910	1,250	655	440	1,030	520	5,060
24	480	970	2,080	1,030	655	565	910	460	970
25	460	970	1,250	910	610	1,030	800	440	610
26	440	970	1,030	850	610	800	700	460	520
27	440	1,520	970	1,030	700	800	700	440	542
28	440	1,170	970	970	700	700	610	400	750
29	1,840	1,030	5,060	1,100	1,330	850	610	382	542
30	1,250	....	1,960	1,170	800	700	610	400	480
31	800	....	1,520	....	700	....	588	382	....

NOTE.—Daily discharge computed from a rating curve fairly well defined below 5,000 second-feet.

Monthly discharge of Tallulah River at Tallulah Falls, Ga., for 1912.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,840	440	641	3.36	3.87	A.
February	1,730	480	828	4.34	4.68	A.
March	5,230	750	1,300	6.81	7.85	B.
April	1,520	850	1,000	5.24	5.85	A.
May	1,330	610	800	4.19	4.83	A.
June	1,100	440	658	3.45	3.85	A.
July	1,730	588	904	4.73	5.45	A.
August	1,100	382	547	2.86	3.30	A.
September	5,060	295	647	3.39	3.78	B.

TALLULAH RIVER AT MATHIS, GA.

Location.—About one-fourth mile southeast of Mathis, Ga., railroad station on the Tallulah Falls Railway and 500 feet below the mouth of Tiger Creek. The station is about 5 miles above Tallulah Falls, Ga., and 1 mile below the Mathis storage dam of the Georgia Railway & Power Co.

Records available.—October 31 to December 31, 1912 (gage heights only).

Drainage area.—Not measured.

Gage.—Staff gage spiked to a big maple tree on the left bank. The present gage is temporary and is to be replaced by a permanent gage at same place.

Discharge measurements.—Will be made by wading or from a cable. No discharge measurements were made at this station during 1912.

Artificial control.—The storage dam of the Georgia Railway & Power Co., about 1 mile above the station, will, when completed, seriously interfere with the natural conditions of flow at this place.

Daily gage height, in feet, of Tallulah River at Mathis, Ga., for 1912.

[Miles Phillips, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	2.15	1.65	11	1.95	1.8	21	1.7	1.7
2	1.95	1.65	12	1.8	1.85	22	1.65	1.7
3	1.9	1.75	13	1.65	1.7	23	1.6	1.75
4	1.9	1.85	14	1.75	1.7	24	1.65	1.95
5	1.8	2.15	15	1.7	1.7	25	1.6	1.85
6	1.9	2.9	16	1.7	1.75	26	1.6	1.7
7	2.45	2.2	17	1.7	1.75	27	1.65	1.85
8	2.25	2.05	18	1.7	1.85	28	1.65	1.8
9	2.05	1.9	19	1.7	1.8	29	1.65	1.75
10	1.95	1.9	20	1.75	1.7	30	1.65	2.2
						31	....	2.05

SANTEE RIVER BASIN.

BROAD RIVER (OF GEORGIA) NEAR CARLTON, GA.

Location.—At the Seaboard Air Line Railway bridge 3 miles east of Carlton, Ga., and 2 miles above the mouth of South Fork, Broad River.

Records available.—May 27, 1897, to December 31, 1912.

Drainage area.—762 square miles.

Gage.—Standard chain gage attached to the railroad bridge; datum unchanged.

Channel.—The bed of the stream is sand and gravel and may be slightly changeable. The left bank overflows for about 400 feet at a gage height of 16 feet.

Discharge measurements.—Made from the upstream side of decked railroad bridge. No discharge measurements were made at this station during 1912.

Artificial control.—The flow is affected little or not at all by artificial control.

Accuracy.—As no discharge measurements have been made at this station since 1910 it is not known what conditions may have affected the rating, and the estimates for 1912 should be used with caution.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Daily gage height, in feet, of Broad River (of Georgia) near Carlton, Ga., for 1912.

[M. C. Power, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	3.6	2.7	3.3	4.2	2.3	3.0	2.4	2.4	2.8	2.5	2.3
2	4.2	2.8	2.3	2.8	3.8	2.5	2.7	3.0	2.2	2.5	2.3	2.5
3	3.6	2.3	2.8	2.5	2.9	3.0	3.1	2.6	2.5	2.2	2.2	2.2
4	2.8	2.1	3.3	2.3	3.2	3.3	2.7	2.8	2.4	2.5	2.4	2.5
5	2.4	2.3	2.8	2.5	3.1	2.9	3.2	3.1	2.6	3.9	2.6	2.7
6	2.2	2.0	5.5	2.2	3.5	3.5	5.9	2.7	2.9	3.2	2.4	2.4
7	2.3	2.2	5.2	2.5	3.2	4.5	4.0	2.4	2.6	2.5	3.5	2.8
8	2.6	2.4	4.2	2.3	4.5	5.0	3.1	2.3	2.5	2.7	3.4	2.5
9	2.9	2.1	3.2	2.6	3.8	3.9	2.8	4.5	2.1	2.4	2.9	2.3
10	3.2	2.3	3.0	2.4	3.0	2.7	3.6	6.2	2.4	2.7	2.5	2.6
11	2.7	2.3	2.5	2.2	2.5	3.0	3.9	5.5	2.9	2.5	2.7	2.4
12	2.4	2.1	2.9	2.4	3.0	2.7	4.9	3.8	3.2	2.3	2.4	2.2
13	2.1	2.4	2.7	2.6	2.7	2.4	3.0	2.6	2.8	2.8	2.6	2.0
14	2.8	2.2	2.5	2.5	2.3	6.5	3.5	2.4	3.0	3.2	2.3	2.3
15	2.5	5.0	26.1	2.8	2.5	17.0	4.2	2.2	4.8	2.6	2.5	2.1
16	2.2	7.6	21.9	2.5	3.0	9.1	3.2	2.4	4.6	3.0	2.2	2.3
17	2.0	6.8	12.0	5.5	2.7	7.5	4.1	2.6	3.8	2.5	2.4	2.5
18	2.3	5.3	4.5	5.2	2.3	3.3	5.5	2.9	2.7	2.3	2.2	2.2
19	2.5	4.4	3.7	4.6	2.8	2.6	4.5	2.6	3.0	2.7	2.5	2.6
20	2.3	2.8	2.8	3.5	2.5	2.8	7.6	2.9	2.6	6.8	2.2	2.3
21	2.2	2.5	2.5	3.5	2.8	2.5	6.2	2.7	2.3	4.9	2.0	2.1
22	2.4	6.2	2.3	3.1	2.5	2.2	4.4	2.5	2.8	3.4	2.3	2.4
23	2.2	4.8	2.5	7.2	2.2	2.5	3.5	2.8	3.6	2.8	2.6	2.2
24	2.5	3.3	3.5	7.9	2.4	2.2	3.0	2.4	5.7	2.3	2.3	3.0
25	2.3	4.6	3.8	3.9	2.2	8.0	2.8	2.2	4.4	2.4	2.1	3.3
26	2.1	7.4	2.6	2.8	2.3	10.2	2.5	2.5	3.7	2.2	2.4	2.5
27	2.3	7.0	2.3	2.4	2.1	6.1	2.2	3.0	4.8	2.4	2.2	2.3
28	2.2	6.2	2.6	3.4	3.4	4.2	2.8	2.6	3.2	2.2	2.5	2.1
29	2.5	3.7	6.3	4.2	3.8	3.1	2.4	2.4	2.9	2.3	2.3	3.0
30	3.7	......	7.8	3.7	4.7	2.6	2.2	2.2	2.5	2.4	2.1	2.7
31	5.9	......	8.3	......	3.3	......	2.5	2.0	......	2.2	......	2.4

Daily discharge, in second-feet, of Broad River (of Georgia) near Carlton, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,070	1,540	865	1,290	2,060	645	1,070	695	695	930	750	645
2	2,060	930	645	930	1,700	750	865	1,070	595	750	645	750
3	1,540	645	930	750	1,000	1,070	1,140	805	750	595	595	595
4	930	545	1,290	645	1,220	1,290	865	930	695	750	695	750
5	695	645	930	750	1,140	1,000	1,220	1,140	805	1,790	805	865
6	595	500	3,440	595	1,450	1,450	3,920	865	1,000	1,220	695	695
7	645	595	3,100	750	1,220	2,350	1,880	695	805	750	1,450	930
8	805	695	2,060	645	2,350	2,880	1,140	645	750	865	1,370	750
9	1,000	545	1,220	805	1,700	1,790	930	2,350	545	695	1,000	645
10	1,220	645	1,070	695	1,070	865	1,540	4,300	695	865	750	805
11	865	645	750	595	750	1,070	1,790	3,440	1,000	750	865	695
12	695	545	1,000	695	1,070	865	2,770	1,700	1,220	645	695	595
13	545	695	865	805	865	695	1,070	805	930	930	805	500
14	930	595	750	750	645	4,690	1,450	695	1,070	1,220	645	645
15	750	2,880	38,600	930	750	21,500	2,060	595	2,660	805	750	545
16	595	6,200	30,100	750	1,070	8,370	1,220	695	2,450	1,070	595	645
17	500	5,090	13,000	3,440	865	6,060	1,970	805	1,700	750	695	750
18	645	3,210	2,350	3,100	645	1,290	3,440	1,000	865	645	595	595
19	750	2,260	1,620	2,450	930	805	2,350	805	1,070	865	750	805
20	645	930	930	1,450	750	930	6,200	1,000	805	5,090	595	645
21	595	750	750	1,450	930	750	4,300	865	645	2,770	500	545
22	695	4,300	645	1,140	750	595	2,260	750	930	1,370	645	695
23	595	2,660	750	5,640	595	750	1,450	930	1,540	930	805	595
24	750	1,290	1,450	6,620	695	595	1,070	695	3,680	645	645	1,070
25	645	2,450	1,700	1,790	595	6,760	930	595	2,260	695	545	1,290
26	545	5,920	805	930	645	10,100	750	750	1,620	595	695	750
27	645	5,360	645	695	545	4,180	595	1,070	2,660	695	595	645
28	595	4,300	805	1,370	1,370	2,060	930	805	1,220	595	750	545
29	750	1,620	4,430	2,060	1,700	1,140	695	695	1,000	645	645	1,070
30	1,620	......	6,480	1,620	2,560	805	595	595	750	695	545	865
31	3,920	......	7,200	......	1,290	......	750	500	......	595	......	695

NOTE.—Daily discharge computed from the rating curve used since 1906. The curve is well defined below 9,800 second-feet.

Monthly discharge of Broad River (of Georgia) near Carlton, Ga., for 1912.

[Drainage area, 762 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	3,920	500	930	1.22	1.41
February	6,200	500	2,030	2.66	2.87
March	38,600	645	4,230	5.55	6.40
April	6,620	595	1,540	2.02	2.25
May	2,560	545	1,130	1.48	1.71
June	21,500	595	2,940	3.86	4.31
July	6,200	595	1,720	2.26	2.61
August	4,300	500	1,070	1.40	1.61
September	3,680	545	1,250	1.64	1.83
October	5,090	595	1,040	1.36	1.57
November	1,450	500	737	.967	1.08
December	1,290	500	730	.958	1.10
The year	38,600	500	1,610	2.11	28.75

ALTAMAHA RIVER BASIN.

OCMULGEE RIVER NEAR JACKSON, GA.

Location.—At Pittmans Ferry, 8 miles southeast of Jackson, Ga., half a mile above the mouth of Yellow Water Creek and a short distance below Heards Creek. The station is 1½ miles below the 100-foot dam and power plant of the Central Georgia Power Co.

Records available.—May 18, 1906, to December 31, 1912.

Drainage area.—1,400 square miles.

Gage.—Vertical staff in three sections, on right bank of river, upstream side of ferry landing; datum unchanged.

Channel.—Bottom sandy; shifts considerably, but the shifting has little, if any, effect on the rating, as the control is formed by a rocky ledge about 400 feet below the gage.

Discharge measurements.—Made at the ferry, either from the ferryboat or a small boat held in place by the ferry cable.

Artificial control.—Since the power plant of the Central Georgia Power Co. has been in operation the artificial regulation has very greatly affected the normal low water flow.

Accuracy.—The records are based on two gage-height readings a day, but as there is a large diurnal fluctuation, due to the operation of the power plant above, it is possible that the estimates of daily discharge may be considerably in error for individual days, especially at low stages.

The following discharge measurement was made by W. E. Hall:

December 11, 1912, gage height, 4.76 feet; discharge, 1,400 second-feet.

Daily gage height, in feet, of Ocmulgee River near Jackson, Ga., for 1912.

[C. A. Pittman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.6	6.7	5.8	6.8	5.4	5.3	5.45	4.45	4.40	4.85	4.85	4.32
2	5.6	6.0	5.6	6.4	5.3	5.15	5.35	4.6	4.45	4.75	4.7	4.8
3	5.5	5.6	5.45	6.0	5.2	5.45	5.9	4.6	4.40	4.6	4.32	4.8
4	5.5	5.5	5.5	5.7	5.8	5.9	6.2	4.6	4.40	5.4	4.9	4.85
5	5.4	5.2	5.7	5.6	6.8	5.6	5.8	4.6	4.6	6.6	4.75	4.8
6	5.2	5.05	6.4	5.5	6.7	5.7	5.9	4.65	4.8	6.2	4.75	4.8
7	5.0	5.0	6.8	5.4	6.4	7.0	5.8	4.6	4.5	5.6	4.7	4.7
8	5.15	5.0	6.4	5.3	7.6	7.8	5.5	4.6	4.40	5.25	4.9	4.10
9	5.8	4.9	6.0	5.3	6.4	6.8	5.4	4.8	4.40	4.9	4.9	4.6
10	6.0	5.0	5.8	5.3	5.8	5.9	5.6	5.0	4.45	4.95	4.6	4.95
11	5.7	5.0	5.8	5.2	5.6	5.4	5.4	5.25	4.55	4.7	4.9	4.9
12	5.5	5.0	5.6	5.2	5.5	5.2	6.6	5.2	4.6	4.65	4.9	4.8
13	5.35	4.9	5.6	5.2	5.4	5.05	7.0	4.95	4.45	4.35	4.7	4.9
14	5.2	5.0	5.6	5.15	5.3	6.0	6.6	4.85	4.40	4.7	4.8	4.6
15	5.2	6.0	13.2	5.1	5.15	10.0	6.0	4.8	4.40	4.6	4.75	4.5
16	5.1	7.8	19.9	5.9	5.15	10.7	5.5	4.7	4.40	4.85	4.65	4.8
17	4.95	7.3	16.7	8.2	5.25	8.4	5.6	4.85	4.5	5.0	4.35	4.8
18	4.9	6.2	10.8	8.4	5.05	6.8	5.8	4.8	4.65	5.0	4.85	4.9
19	4.95	6.0	8.0	7.3	5.0	6.1	5.6	5.5	4.55	4.6	4.9	4.8
20	5.0	5.6	6.8	6.8	4.8	5.45	5.3	5.1	4.5	4.7	4.8	4.9
21	5.0	6.2	6.4	7.6	4.95	5.3	5.2	4.9	4.45	5.45	4.8	4.9
22	5.0	6.6	6.2	8.2	4.9	5.1	5.2	4.9	4.15	5.2	4.8	3.7
23	4.9	6.4	6.0	10.0	4.85	5.0	5.0	4.9	5.25	5.05	4.85	4.40
24	4.9	6.8	6.3	8.4	4.85	5.0	4.95	4.8	5.4	4.95	4.30	4.55
25	4.9	7.4	6.8	6.8	4.8	5.4	4.9	4.7	5.3	4.7	4.9	4.95
26	4.8	7.4	6.6	6.1	4.8	7.6	4.9	5.0	5.2	4.65	4.8	5.05
27	4.7	7.0	6.2	5.7	4.85	7.9	4.8	4.9	5.1	4.45	4.8	5.35
28	4.7	6.8	5.9	5.6	4.75	6.6	4.75	4.65	4.9	4.75	4.7	5.6
29	5.05	6.4	7.6	5.6	4.95	5.9	4.7	4.6	4.8	4.7	4.9	4.28
30	6.6	......	9.0	5.5	5.7	5.6	4.6	4.5	5.1	4.8	4.9	5.5
31	7.8	......	8.0	......	5.6	......	4.55	4.5	......	4.5	......	5.2

Daily discharge, in second-feet, of Ocmulgee River near Jackson, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,050	5,300	3,460	5,510	2,640	2,440	2,740	858	790	1,520	1,520	694
2	3,050	3,870	3,050	4,690	2,440	2,130	2,540	1,080	858	1,330	1,240	1,420
3	2,840	3,050	2,740	3,870	2,230	2,740	3,660	1,080	790	1,080	694	1,420
4	2,840	2,840	2,840	3,260	3,460	3,660	4,280	1,080	790	2,640	1,620	1,520
5	2,640	2,230	3,260	3,050	5,510	3,050	3,460	1,080	1,080	5,100	1,330	1,420
6	2,230	1,920	4,690	2,840	5,300	3,260	3,660	1,160	1,420	4,280	1,330	1,420
7	1,820	1,820	5,510	2,640	4,690	5,920	3,460	1,080	925	3,050	1,240	1,240
8	2,130	1,820	4,690	2,440	7,150	7,560	2,840	1,080	790	2,330	1,620	470
9	3,460	1,620	3,870	2,440	4,690	5,510	2,640	1,420	790	1,620	1,620	1,080
10	8,870	1,820	3,460	2,440	3,460	3,660	3,050	1,820	858	1,720	1,080	1,720
11	3,260	1,820	3,460	2,230	3,050	2,640	2,640	2,330	1,000	1,240	1,620	1,620
12	2,840	1,820	3,050	2,230	2,840	2,230	5,100	2,230	1,080	1,160	1,620	1,420
13	2,540	1,620	3,050	2,230	2,640	1,920	5,920	1,720	858	730	1,240	1,620
14	2,230	1,820	3,050	2,130	2,440	3,870	5,100	1,520	790	1,240	1,420	1,080
15	2,230	3,870	18,800	2,020	2,130	12,100	3,870	1,420	790	1,080	1,330	925
16	2,020	7,560	32,900	3,660	2,130	13,600	2,840	1,240	790	1,520	1,160	1,420
17	1,720	6,540	26,200	8,380	2,330	8,790	3,050	1,520	925	1,820	730	1,420
18	1,620	4,280	13,800	8,790	1,920	5,510	3,460	1,420	1,160	1,820	1,520	1,620
19	1,720	3,870	7,970	6,540	1,820	4,080	3,050	2,840	1,000	1,080	1,620	1,420
20	1,820	3,050	5,510	5,510	1,420	2,740	2,440	2,020	925	1,240	1,420	1,620
21	1,820	4,280	4,690	7,150	1,720	2,440	2,230	1,620	858	2,740	1,420	1,620
22	1,820	5,100	4,280	8,380	1,620	2,020	2,230	1,620	518	2,230	1,420	210
23	1,620	4,690	3,870	12,100	1,520	1,820	1,820	1,620	2,330	1,920	1,520	790
24	1,620	5,510	4,480	8,790	1,520	1,820	1,720	1,420	2,640	1,720	670	1,000
25	1,620	6,740	5,510	5,510	1,420	2,640	1,620	1,240	2,440	1,240	1,620	1,720
26	1,420	6,740	5,100	4,080	1,420	7,150	1,620	1,820	2,230	1,160	1,420	1,920
27	1,240	5,920	4,280	3,260	1,520	7,760	1,420	1,620	2,020	858	1,420	2,540
28	1,240	5,510	3,660	3,050	1,330	5,100	1,330	1,160	1,620	1,330	1,240	3,050
29	1,920	4,690	7,150	3,050	1,720	3,660	1,240	1,080	1,420	1,240	1,620	649
30	5,100	......	10,000	2,840	3,260	3,050	1,080	925	2,020	1,420	1,620	2,840
31	7,560	......	7,970	......	3,050	......	1,000	925	......	925	......	2,230

NOTE.—Daily discharge computed from a rating curve fairly well defined below 10,000 second-feet.

Monthly discharge of Ocmulgee River near Jackson, Ga., for 1912.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	7,560	1,240	2,480	C.
February	7,560	1,620	3,850	C.
March	32,900	2,740	6,980	D.
April	12,100	2,020	4,500	C.
May	7,150	1,330	2,720	C.
June	13,600	1,820	4,500	C.
July	5,920	1,000	2,810	C.
August	2,840	858	1,450	D.
September	2,640	518	1,220	D.
October	5,100	730	1,750	D.
November	1,620	670	1,360	D.
December	3,050	210	1,460	D.
The year	32,900	210	2,920	

OCMULGEE RIVER AT MACON, GA.

Location.—At the Fifth Street bridge in the city of Macon, near the Southern Railway passenger depot and about 500 feet above the Central of Georgia Railway bridge.

Records available.—October 18, 1895, to December 31, 1912.

Drainage area.—2,420 square miles.

Gage.—The United States Weather Bureau gage originally used at this station is a heavy timber bolted to a pier of the Central of Georgia Railway bridge. A standard chain gage was installed October 9, 1905, on the downstream steel handrail of highway bridge, about 600 feet upstream from old gage. These gages have been referred to the same datum and have given practically the same readings. Since August 1, 1912, the old relation of gage height to discharge has been considerably changed owing to the construction of a dock about 800 feet below the gage.

Channel.—Both banks are high and neither is subject to overflow; bed soft and shifting; considerable change in the station rating curve has occurred as the result of changes in the river bed at and below the station.

Discharge measurements.—Made from the downstream side of the highway bridge to which the gage is attached.

Artificial control.—The natural condition of flow, especially at low stages, is likely to be considerably affected by the operations of the power dam near Jackson, Ga.

Accuracy.—As the station is situated below the fall line, rapidly rising or falling stages are likely to be attended by variations in surface slope, causing greater or less discharge than for the normal rating. The possible error in mean gage heights due to artificial control may cause the estimates for individual days to be considerably in error, especially at low stages. No rating has been developed for the changed conditions due to the construction of the new dock about 800 feet below the gage, and, owing to the uncertainty as to the applicability of the old rating to observations made during the period of the construction of the dock, no estimates of daily discharge are given for 1912.

Cooperation.—Since June 1, 1899, all gage heights have been furnished by the United States Weather Bureau.

Discharge measurements of Ocmulgee River at Macon, Ga., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 23	W. E. Hall	17.15	16,90
Aug. 22	....do	5.16	2,24

Daily gage height, in feet, of Ocmulgee River at Macon, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.3	13.2	9.0	12.4	7.9	7.6	7.0	4.5	3.8	5.4	3.6	3.6
2	9.2	10.9	7.8	10.8	7.4	6.3	7.1	4.5	3.5	4.8	4.0	2.6
3	8.0	9.7	6.9	9.6	7.2	7.1	7.2	4.4	3.6	4.4	3.5	3.5
4	8.0	7.0	10.0	8.4	9.2	10.2	11.9	4.5	3.5	4.3	2.7	3.7
5	7.1	5.8	8.6	7.7	10.1	10.2	10.0	4.2	3.6	6.5	3.6	3.7
6	6.4	5.6	16.0	7.5	14.9	10.3	8.6	4.4	6.7	10.1	3.5	3.7
7	5.7	5.0	13.4	7.2	12.2	16.6	8.8	4.4	4.9	8.5	7.5	3.7
8	5.4	4.6	12.3	6.9	12.0	15.0	7.7	4.2	4.2	6.6	5.5	3.4
9	14.7	4.5	11.0	7.1	12.3	12.8	6.9	5.7	3.5	5.5	4.7	2.4
10	11.8	4.4	10.0	6.9	10.3	10.7	7.0	5.6	3.7	4.9	4.5	3.1
11	10.0	4.5	8.6	6.8	8.5	8.6	7.4	5.9	3.6	4.5	3.5	3.7
12	8.4	4.2	10.2	6.7	7.6	7.0	8.3	6.4	5.0	4.2	4.3	3.5
13	7.3	4.7	10.0	6.6	7.3	6.2	13.9	6.1	4.4	3.9	4.1	3.6
14	6.8	4.5	8.8	6.5	7.2	6.3	12.6	5.5	4.1	3.8	3.9	3.6
15	5.9	10.5	16.7	6.2	6.6	9.0	10.9	5.0	3.9	4.2	4.0	3.0
16	5.7	12.5	22.7	11.1	6.5	15.6	8.9	4.7	3.8	4.8	3.8	2.4
17	5.1	13.9	22.3	15.6	6.6	15.4	11.9	7.8	4.4	4.8	3.8	3.1
18	4.8	12.0	20.2	16.9	6.5	12.8	12.7	5.8	4.4	4.7	2.8	3.4
19	4.9	9.8	15.4	14.7	6.1	10.0	11.2	5.0	4.0	4.4	3.7	3.5
20	5.6	8.4	12.1	12.2	5.7	8.2	8.3	6.7	3.7	4.5	3.5	3.4
21	5.5	7.6	10.6	16.9	6.0	6.9	6.8	5.8	3.5	3.7	3.8	3.5
22	5.0	14.4	9.5	15.1	5.9	6.4	6.1	5.0	3.2	5.9	3.6	3.1
23	4.9	13.7	8.7	17.7	5.7	5.7	6.2	5.0	4.1	5.5	3.6	2.4
24	4.6	12.3	9.6	16.2	5.6	5.3	5.7	5.1	11.8	4.9	3.6	10.3
25	4.4	15.4	11.6	13.1	5.4	8.8	5.6	4.6	7.8	4.6	2.6	5.4
26	4.2	14.0	11.4	11.0	5.4	11.6	5.5	5.0	6.0	4.1	3.8	5.1
27	4.0	13.6	11.1	9.5	5.0	14.4	5.4	5.7	5.6	3.7	3.8	5.7
28	3.9	12.2	8.9	8.6	5.6	12.7	5.1	5.5	4.8	3.0	4.1	5.9
29	3.6	10.5	10.4	8.0	5.7	10.8	4.7	4.5	4.3	4.0	3.6	4.9
30	12.6	......	14.4	8.0	9.7	8.4	4.9	4.1	4.4	3.9	4.0	3.7
31	13.1	......	14.4	......	8.7	......	4.8	3.9	......	3.8	......	5.3

OCONEE RIVER NEAR GREENSBORO, GA.

Location.—At the highway bridge, 5 miles west of Greensboro on the road to Madison, Ga., about 4 miles above the mouth of Apalachee River and 1½ miles below Town Creek.

Records available.—July 25, 1903, to December 31, 1912.

Drainage area.—1,100 square miles.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—Bed composed chiefly of sand; slightly shifting.

Discharge measurements.—Made from the downstream side of the bridge.

Artificial control.—In the spring of 1911 a new dam was completed near Athens, Ga., greatly increasing the storage capacity in that vicinity. The operation of this dam does not appear to cause very great daily fluctuation at Greensboro, but it does cause abnormally low daily discharge at times.

Accuracy.—Owing to the operation of power plants above the station it is probable that the estimates of daily discharge may be somewhat in error for individual days, especially at low stages.

Discharge measurements of Oconee River near Greensboro, Ga., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 17	W. E. Hall	3.56	1,150
Dec. 17	....do	2.49	738

Daily gage height, in feet, of Oconee River near Greensboro, Ga., for 1912.

[W. E. Strickland, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	9.4	6.8	9.7	4.6	5.7	5.0	3.4	2.4	3.0	5.4	2.6
2	5.7	7.1	5.2	6.6	4.7	5.0	4.3	3.6	2.2	2.8	3.6	2.6
3	5.6	5.4	5.4	5.6	4.4	4.1	5.8	3.2	1.9	2.3	3.0	2.4
4	5.7	4.2	6.2	5.0	5.2	4.9	5.2	3.1	1.8	2.4	2.8	2.7
5	4.2	4.0	6.4	4.9	7.0	6.8	5.4	3.0	1.7	5.4	2.8	3.0
6	4 4	3.8	8.2	4.8	6.8	7.4	5.8	2.8	1.8	5.2	3.0	2.7
7	3.9	3.6	10.4	4.6	7.4	10.2	5.2	2.8	2.0	4.5	4.9	2.8
8	4.4	3.4	8.4	4.6	7.4	7.9	5.0	3.0	2.2	3.7	3	2.6
9	6.8	3.2	6.8	4.4	6.0	6.2	5.9	3.8	2.3	3.3	3.4	2.3
10	6.2	3.0	5.8	4.3	4.8	4.4	9.4	5.4	2.6	3.0	2.8	2.5
11	5.0	3.3	5.0	4.4	4.4	3.8	7.6	8.4	2.9	2.4	2.6	3.0
12	4.6	3.5	5.9	4.2	4.2	3.6	12.0	7.4	2.7	1.8	2.8	3.0
13	4.4	3.4	5.4	4.0	4.2	3.3	15.0	6.1	2.6	1.6	3.5	2.8
14	4.4	6.4	5.3	3.8	3.9	7.4	13.8	3.8	3.4	1.8	3.5	2.7
15	4.1	9.8	17.8	3.9	3.6	13.5	10.8	3.4	7.0	2.1	3.2	2.6
16	3.6	12.4	27.4	8.6	4.0	19.6	7.1	3.2	6.4	2.4	3.1	2.6
17	3.4	11.5	25.3	10.2	3.8	19.7	6.0	3.0	5.8	2.6	3.0	2.6
18	3.6	8.5	20.4	11.3	3.6	13.6	6.8	3.0	5.4	3.8	2.9	2.6
19	3.8	6.9	14.0	9.9	3.6	7.0	8.0	4.0	4.2	4.2	2.8	2.8
20	4.0	8.8	7.4	7.8	3.4	5.0	7.4	4.0	3.1	4.7	2.6	2.6
21	3.8	10.2	6.2	7.4	3.3	4.7	7.1	3.6	2.6	4.7	2.9	2.6
22	3.7	11.2	5.8	9.4	3.4	4.1	6.6	3.2	2.7	4.2	2.6	2.6
23	3.6	9.0	5.5	12.5	3.4	3.9	5.8	2.8	4.1	4.0	2.7	2.8
24	3.2	9.4	6.2	12.0	3.4	3.6	5.5	2.6	11.3	3.6	2.6	4.4
25	3.2	10.4	7.8	10.8	3.2	7.6	5.0	3.4	11.0	3.2	2.5	5.2
26	3.2	10.0	6.7	7.1	3.1	10.2	4.4	3.5	7.6	2.9	2.4	4.0
27	3.0	11.5	5.8	5.2	3.0	11.8	3.6	3.2	3.6	2.7	2.6	3.6
28	3.8	11.3	5.6	5.2	5.5	10.8	3.4	3.0	4.3	2.5	4.5	3.4
29	6.6	7.8	10.7	5.5	4.8	7.6	3.4	2.8	5.6	2.3	4.4	3.4
30	9.4	......	13.4	5.0	8.4	4.9	3.2	2.7	3.4	2.2	2.8	3.4
31	9.6	......	13.0	......	8.1	......	3.0	2.5	......	2.6	......	3.4

Daily discharge, in second-feet, of Oconee River near Greensboro, Ga., for 1912.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,220	4,350	2,770	4,540	1,640	2,180	1,820	1,110	750	960	2,020	820
2	2,180	2,940	1,920	2,660	1,680	1,820	1,500	1,190	680	890	1,190	820
3	2,120	2,020	2,020	2,120	1,540	1,410	2,220	1,030	582	715	960	750
4	2,180	1,460	2,440	1,820	1,920	1,780	1,920	995	550	750	890	855
5	1,460	1,360	2,550	1,780	2,880	2,770	2,020	960	520	2,020	890	960
6	1,540	1,280	3,590	1,720	2,770	3,110	2,220	890	550	1,920	960	855
7	1,320	1,190	5,000	1,640	3,110	4,870	1,920	890	614	1,590	1,780	890
8	1,540	1,110	3,710	1,640	3,110	3,410	1,820	960	680	1,230	1,280	820
9	2,770	1,030	2,770	1,540	2,330	2,440	2,280	1,280	715	1,070	1,110	715
10	2,440	960	2,220	1,500	1,720	1,540	4,350	2,020	820	960	890	785
11	1,820	1,070	1,820	1,540	1,540	1,280	3,230	3,710	925	750	820	960
12	1,640	1,150	2,280	1,460	1,460	1,190	6,110	3,110	855	550	890	960
13	1,540	1,110	2,020	1,360	1,460	1,070	8,330	2,380	820	490	1,150	890
14	1,540	2,550	1,980	1,280	1,320	3,110	7,430	1,280	1,110	550	1,150	855
15	1,410	4,610	10,500	1,320	1,190	7,200	5,270	1,110	2,880	647	1,030	820

Daily discharge, in second-feet, of Oconee River near Greensboro, Ga., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	1,190	6,390	18,600	3,830	1,360	11,900	2,940	1,030	2,550	750	995	820
17	1,110	5,760	16,700	4,870	1,280	12,000	2,330	960	2,220	820	960	820
18	1,190	3,770	12,600	5,620	1,190	7,280	2,770	960	2,020	1,280	925	820
19	1,280	2,820	7,580	4,680	1,190	2,880	3,470	1,360	1,460	1,460	890	890
20	1,360	3,960	3,110	3,350	1,110	1,820	3,110	1,360	995	1,680	820	820
21	1,280	4,870	2,440	3,110	1,070	1,680	2,940	1,190	820	1,680	925	820
22	1,230	5,550	2,220	4,350	1,110	1,410	2,660	1,030	855	1,460	820	820
23	1,190	4,090	2,080	6,460	1,110	1,320	2,220	890	1,410	1,360	855	890
24	1,030	4,350	2,440	6,110	1,110	1,190	2,080	820	5,620	1,190	820	1,540
25	1,030	5,000	3,350	5,270	1,030	3,230	1,820	1,110	5,410	1,030	785	1,920
26	1,030	4,740	2,720	2,940	995	4,870	1,540	1,150	3,230	925	750	1,360
27	960	5,760	2,220	1,920	960	5,970	1,190	1,030	1,190	855	820	1,190
28	1,280	5,620	2,120	1,920	2,080	5,270	1,110	960	1,500	785	1,590	1,110
29	2,660	3,350	5,200	2,080	1,720	3,230	1,110	890	2,120	715	1,540	1,110
30	4,350	....	7,130	1,820	3,710	1,780	1,030	855	1,110	680	890	1,110
31	4,480	....	6,830	....	3,530	....	960	785	....	820	....	1,110

NOTE.—Daily discharge computed from a rating curve fairly well defined below 6,000 second-feet. Above 6,000 second-feet the discharges, as shown above, are probably too low.

Monthly discharge of Oconee River near Greensboro, Ga., for 1912.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	4,480	960	1,750	A.
February	6,390	960	3,250	A.
March	18,600	1,820	4,680	B.
April	6,460	1,280	2,880	A.
May	3,710	960	1,750	A.
June	12,000	1,070	3,500	B.
July	8,330	960	2,770	B.
August	3,710	785	1,270	A.
September	5,620	520	1,520	A.
October	2,020	490	1,050	A.
November	2,020	750	1,050	A.
December	1,920	715	965	A.
The year	18,600	490	2,200	

OCONEE RIVER AT FRALEYS FERRY, NEAR MILLEDGEVILLE, GA.

Location.—At Fraleys Ferry, 6 miles above Milledgeville, Ga., and about 4 miles below the mouth of Little River.

Records available.—May 23, 1906, to December 31, 1908; October 6, 1909, to December 31, 1912.

Drainage area.—2,840 square miles.

Gage.—Sloping section of timber, bolted to solid rock on left bank above the ferry landing; datum unchanged.

Channel.—Sandy and shifting at measuring section; rock control below.

Discharge measurements.—Made from ferry boat. No discharge measurements were made at this station during 1912.

Artificial control.—None below vicinity of Athens, Ga., where storage may cause low daily discharge at this station at times.

Accuracy.—Records for previous years excellent, except for high stages which can not be measured. Estimates for 1912 are based on 1911 rating.

Daily gage height, in feet, of Oconee River near Milledgeville, Ga., for 1912.

[H. A. Taylor, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.3	10.0	7.7	9.2	7.0	7.4	6.8	5.8	5.6	6.0	5.6	6.0
2	8.0	7.9	7.2	8.0	6.8	6.8	7.1	6.0	5.5	5.9	5.7	5.9
3	7.6	7.4	7.1	7.5	6.8	6.6	7.8	6.0	5.45	5.8	5.8	5.8
4	7.6	6.8	7.6	7.2	7.6	8.6	7.8	6.0	5.4	5.8	5.8	5.8
5	7.2	6.6	7.8	7.0	8.4	8.6	7.4	6.0	5.4	7.0	5.8	5.8
6	7.0	6.5	[b]12.6	6.9	10.1	8.5	8.2	5.9	5.5	7.0	5.8	5.8
7	6.8	6.4	10.7	6.9	9.7	17.2	8.7	5.9	5.5	6.7	9.0	5.8
8	7.4	6.4	9.2	6.8	9.5	14.0	7.6	6.1	5.5	6.4	8.6	6.0
9	10.6	6.4	8.3	6.8	8.4	9.4	6.8	6.4	5.4	5.0	7.0	6.0
10	8.7	6.4	7.8	6.7	7.5	7.6	7.4	7.4	5.45	5.8	6.3	5.9
11	7.7	6.4	7.4	6.7	7.0	7.0	7.6	8.4	5.8	5.8	6.0	5.8
12	7.4	6.4	8.2	6.7	6.8	6.8	11.4	7.6	6.2	5.8	6.0	5.8
13	7.3	6.4	8.0	6.6	6.8	6.6	10.6	6.7	6.0	5.8	6.0	5.8
14	7.2	6.4	7.6	6.7	6.6	7.0	11.1	6.3	5.9	5.8	6.0	5.8
15	6.8	[a]10.8	9.0	14.3	6.5	8.8	9.2	6.0	6.4	5.8	5.9	5.8
16	6.8	10.8	[b]22.4	14.3	6.4	[a]10.5	7.4	6.2	7.0	6.2	5.9	5.8
17	6.6	10.8	21.6	14.9	6.7	13.2	7.2	7.4	6.4	6.1	5.8	5.8
18	6.5	[a]9.0	18.8	13.8	6.4	12.6	7.6	6.2	6.0	5.8	5.8	5.8
19	6.8	8.2	14.6	11.4	6.3	9.0	7.6	6.6	5.8	6.0	5.8	6.0
20	7.0	7.6	9.7	8.7	6.3	7.0	7.5	6.3	5.6	6.4	5.7	5.9
21	6.8	8.1	8.1	9.7	6.2	6.8	7.1	6.2	5.5	7.4	5.8	5.8
22	6.7	8.6	7.8	10.1	6.2	6.6	6.8	5.9	5.45	7.3	5.8	5.8
23	6.4	12.0	7.6	12.3	6.2	6.4	7.2	6.4	7.2	6.4	5.8	6.0
24	6.4	12.0	8.0	10.6	6.1	6.4	6.6	5.8	9.8	6.0	5.8	8.4
25	6.4	[a]12.0	8.8	9.0	6.1	8.6	6.6	5.8	9.0	5.8	5.8	7.7
26	6.3	[a]11.0	8.4	8.2	6.0	9.6	6.2	6.1	7.8	5.8	5.7	6.9
27	6.2	[a]10.0	7.8	7.4	6.0	8.6	6.0	6.0	6.6	5.8	5.8	7.0
28	6.1	[a]9.0	7.4	7.3	6.3	9.2	6.0	6.0	6.4	5.8	5.8	6.8
29	6.3	8.4	9.4	7.2	7.0	8.2	5.9	5.8	6.2	5.8	5.8	6.5
30	[a]6.8	......	10.7	7.1	8.1	7.2	5.9	5.6	6.1	5.7	6.0	6.3
31	[a]8.2	......	10.2	......	8.1	......	5.8	5.6	......	5.6	......	6.4

[a] Gage height estimated.

[b] Maximum gage height for the day.

Daily discharge, in second-feet, of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,400	9,780	5,070	8,070	3,770	4,500	3,420	1,870	1,610	2,150	1,610	2,150
2	5,650	5,450	4,130	5,650	3,420	3,420	3,950	2,150	1,490	2,010	1,740	2,010
3	4,880	4,500	3,950	4,690	3,420	3,080	5,260	2,150	1,440	1,870	1,870	1,870
4	4,880	3,420	4,880	4,130	4,880	6,850	5,260	2,150	1,380	1,870	1,870	1,870
5	4,130	3,080	5,260	3,770	6,450	6,850	4,500	2,150	1,380	3,770	1,870	1,870
6	3,770	2,920	14,000	3,590	10,000	6,650	6,050	2,010	1,490	3,770	1,870	1,870
7	3,420	2,760	11,300	3,590	9,120	29,000	7,050	2,010	1,490	3,250	7,650	1,870
8	4,500	2,760	8,070	3,420	8,700	20,000	4,880	2,300	1,490	2,760	6,850	2,150
9	11,100	2,760	6,250	3,420	6,450	8,490	3,420	2,760	1,380	990	3,770	2,150
10	7,050	2,760	5,260	3,250	4,690	4,880	4,500	4,500	1,440	1,870	2,600	2,010
11	5,070	2,760	4,500	3,250	3,770	3,770	4,880	6,450	1,870	1,870	2,150	1,870
12	4,500	2,760	6,050	3,250	3,420	3,420	13,000	4,880	2,450	1,870	2,150	1,870
13	4,310	2,760	5,650	3,080	3,420	3,080	11,100	3,250	2,150	1,870	2,150	1,870
14	4,130	2,760	4,880	3,250	3,080	3,770	12,300	2,600	2,010	1,870	2,150	1,870
15	3,420	11,600	7,650	20,800	2,920	7,250	8,070	2,150	2,760	1,870	2,010	1,870
16	3,420	11,600	38,500	20,800	2,760	10,900	4,500	2,450	3,770	2,450	2,010	1,870
17	3,080	11,600	41,300	22,500	3,250	17,800	4,130	4,500	2,760	2,300	1,870	1,870
18	2,920	7,650	33,400	19,400	2,760	16,100	4,880	2,450	2,150	1,870	1,870	1,870
19	3,420	6,050	21,700	13,000	2,600	7,650	4,880	3,080	1.870	2,150	1,870	2,150
20	3,770	4,880	9,120	7,050	2,600	3,770	4,690	2,600	1,610	2,760	1,740	2,010
21	3,420	5,850	5,850	9,120	2,450	3,420	3,950	2,450	1,490	4,500	1,870	1,870
22	3,250	6,850	5,260	10,000	2,450	3,080	3,420	2,010	1,440	4,310	1,870	1,870
23	2,760	14,500	4,880	15,300	2,450	2,760	4,130	2,760	4,130	2,760	1,870	2,150
24	2,760	14,500	5,650	11,100	2,300	2,760	3,080	1,870	9,340	2,150	1,870	6,450
25	2,760	14,500	7,250	7,650	2,300	6,850	3,080	1,870	7,650	1,870	1,870	5,070
26	2,600	12,000	6,450	6,050	2,150	8,910	2,450	2,300	5,260	1,870	1,740	3,590
27	2,450	9,780	5,260	4,500	2,150	6,850	2,150	2,150	3,080	1,870	1,870	3,770
28	2,300	7,650	4,500	4,310	2,600	8,070	2,150	2,150	2,760	1,870	1,870	3,420
29	2,600	6,450	8,490	4,130	3,770	6,050	2,010	1,870	2,450	1,870	1,870	2,920
30	3,420	......	11,300	3,950	5,850	4,130	2,010	1,610	2,300	1,740	2,150	2,600
31	6,050	......	10,200	......	5,850	......	1,870	1,610	......	1,610	......	2,760

NOTE.—Daily discharge computed from a rating curve well defined below 5,600 second-feet.

Monthly discharge of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1912.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
January	11,100	2,300	4,260
February	14,600	2,760	6,780
March	41,300	3,950	10,200
April	22,500	3,080	7,870
May	10,000	2,150	4,060
June	29,000	2,760	7,470
July	13,000	1,870	4,870
August	6,450	1,610	2,620
September	9,340	1,380	2,600
October	4,500	990	2,310
November	7,650	1,610	2,350
December	6,450	1,870	2,430
The year	41,300	990	4,800

OCONEE RIVER AT DUBLIN, GA.

Location.—At the Wrightsville & Tennille Railroad bridge at Dublin, Ga.

Records available.—February 11, 1898, to December 31, 1912; fragmentary records prior to 1898.

Drainage area.—4,180 square miles.

Gage.—Vertical timber attached to the downstream side of the central or turn-span pier of the railroad bridge; also a short sloping section bolted to rock just above the bridge on the right bank. The datum has not been changed.

Channel.—Rocky and nearly permanent at the wagon bridge, but shifting of the bottom in the channel below causes slight changes in the discharge rating. At a stage of about 20 feet the left bank overflows for 1,100 feet through an iron frame trestle approach to the bridge. This ground is thickly covered with brushy growth, which probably retards the flow of water over the overflow section. The right bank does not overflow.

Discharge measurements.—Made from the downstream side of the wagon bridge, 500 feet above the railroad bridge.

Artificial control.—The only power plant of consequence is near Athens, Ga., and is so far above the station that its operation probably does not affect the accuracy of observations at Dublin.

Accuracy.—Lack of data covering changes in channel makes results at this station uncertain prior to 1910. A good degree of accuracy may be obtained by making frequent discharge measurements.

Cooperation.—Since 1898 the gage heights have been furnished by the United States Weather Bureau.

The following discharge measurement was made by W. E. Hall:

April 24, 1912, gage height, 19.98 feet; discharge, 32,300 second-feet.

Daily gage height, in feet, of Oconee River at Dublin, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.8	9.6	14.7	10.0	8.3	6.8	9.7	1.1	0.8	2.6	1.2	2.4
2	8.9	9.8	13.7	11.0	6.9	7.8	8.4	1.0	.8	1.9	1.3	2.3
3	8.7	9.9	12.5	12.0	6.1	7.0	6.2	1.8	.4	1.7	1.4	1.9
4	6.4	9.6	11.2	12.2	6.1	5.1	4.9	2.2	.2	1.4	1.3	1.8
5	9.6	8.7	9.9	11.3	7.1	4.9	6.9	2.2	−.1	1.2	1.0	1.7
6	10.4	7.2	10.9	8.5	7.8	8.5	7.2	2.2	−.2	1.8	1.0	1.7
7	8.9	3.2	11.8	6.2	8.8	10.0	6.4	1.8	−.4	2.8	1.9	1.9
8	7.4	3.3	12.6	5.6	9.9	12.8	6.8	1.7	.6	3.1	6.5	2.3
9	12.9	3.5	15.0	5.2	10.7	13.7	7.0	1.6	.9	2.1	8.4	2.9
10	11.1	3.5	16.2	4.7	11.7	19.0	6.8	2.2	.8	1.6	9.5	2.8
11	8.9	3.7	15.7	4.8	12.2	19.4	6.4	3.4	.7	1.2	10.0	2.7
12	12.5	3.2	12.4	5.1	11.9	17.4	6.8	5.4	2.0	.9	7.1	2.7
13	13.1	3.1	13.2	5.0	9.0	14.4	6.9	6.2	3.0	.8	3.9	1.8
14	11.1	3.0	12.2	4.9	5.9	9.9	7.9	6.3	3.7	.7	2.9	1.5
15	10.9	5.8	11.7	4.9	5.1	5.4	8.4	3.6	3.0	.5	2.3	1.4
16	9.4	8.5	12.6	4.8	4.5	4.9	10.4	2.6	2.2	1.7	2.5	1.1
17	7.8	9.4	13.1	6.1	4.4	7.3	11.9	2.8	3.5	1.9	1.8	.9
18	7.4	10.9	20.8	9.5	4.1	8.0	12.8	2.4	3.2	1.9	2.1	1.6
19	6.8	12.2	25.0	10.9	4.0	9.3	11.9	4.0	2.5	1.7	2.0	1.6
20	4.7	13.2	25.2	15.0	3.5	11.6	9.8	3.2	2.2	1.4	1.8	1.5
21	5.1	13.3	24.5	18.2	3.1	13.9	6.2	2.4	1.1	1.2	1.7	1.3
22	4.8	12.4	22.0	18.7	2.9	13.7	4.8	2.3	.8	2.9	1.7	1.0
23	4.8	11.8	18.7	19.4	2.7	10.7	3.4	2.2	.9	4.8	1.6	.7
24	3.6	11.0	15.6	20.0	2.7	4.8	4.2	2.1	1.9	4.0	1.5	3.9
25	3.4	12.2	12.9	19.4	2.4	3.6	4.7	1.8	5.8	3.2	1.4	7.6
26	3.9	13.2	10.8	18.9	2.2	4.2	3.4	1.7	6.8	1.9	1.2	8.4
27	3.2	14.2	10.0	17.7	1.9	6.4	2.8	2.4	7.5	.9	1.2	8.7
28	2.9	15.4	10.2	15.9	1.9	7.6	2.3	2.4	7.8	1.0	1.2	7.6
29	3.6	15.1	10.4	13.8	2.7	8.8	1.8	1.9	5.4	1.2	1.2	5.6
30	3.8	......	10.1	11.3	2.9	9.4	1.6	1.3	3.9	1.3	1.9	4.9
31	6.2	......	9.6	......	5.1	......	1.2	1.0	......	1.2	......	3.2

Daily discharge, in second-feet, of Oconee River at Dublin, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14,300	12,300	21,400	13,000	10,400	8,340	12,500	2,500	2,260	3,760	2,580	3,580
2	11,200	12,700	19,500	14,600	8,470	9,660	10,500	2,420	2,260	3,140	2,660	3,490
3	11,000	12,800	17,300	16,400	7,480	8,600	7,600	3,060	1,950	2,980	2,740	3,140
4	7,840	12,300	15,000	16,800	7,480	6,310	6,090	3,400	1,810	2,740	2,660	3,060
5	12,300	11,000	12,800	15,100	8,730	6,090	8,470	3,400	1,600	2,580	2,420	2,980
6	13,600	8,860	14,500	10,600	9,660	10,600	8,860	3,400	1,530	3,060	2,420	2,980
7	11,200	4,320	16,000	7,600	11,100	13,000	7,840	3,060	1,400	3,940	3,140	3,140
8	9,120	4,420	17,500	6,880	12,800	17,800	8,340	2,980	2,100	4,220	7,960	3,490
9	18,000	4,620	22,000	6,420	14,100	19,500	8,600	2,900	2,340	3,310	10,500	4,030
10	14,800	4,620	24,400	5,870	15,900	30,200	8,340	3,400	2,260	2,900	12,200	3,940
11	11,200	4,820	23,400	5,980	16,800	31,000	7,840	4,520	2,180	2,580	13,000	3,850
12	17,300	4,320	17,100	6,310	16,200	26,800	8,340	6,640	3,220	2,340	8,730	3,850
13	18,400	4,220	18,600	6,200	11,400	20,900	8,470	7,600	4,120	2,260	5,020	3,060
14	14,800	4,120	16,800	6,090	7,240	12,800	9,800	7,720	4,820	2,180	4,030	2,820
15	14,500	7,120	15,900	6,090	6,310	6,640	10,500	4,720	4,120	2,020	3,490	2,740
16	12,000	10,600	17,500	5,980	5,650	6,090	13,600	3,760	3,400	2,980	3,670	2,500
17	9,660	12,000	18,400	7,480	5,540	8,990	16,200	3,940	4,620	3,140	3,060	2,340
18	9,120	14,500	34,100	12,200	5,220	9,940	17,800	3,580	4,320	3,140	3,310	2,900
19	8,340	16,800	43,400	14,500	5,120	11,900	16,200	5,120	3,670	2,980	3,220	2,900
20	5,870	18,600	43,900	22,000	4,620	15,700	12,700	4,320	3,400	2,740	3,060	2,820
21	6,310	18,800	42,200	28,500	4,220	19,900	7,600	3,580	2,500	2,580	2,980	2,660
22	5,980	17,100	36,700	29,600	4,030	19,500	5,980	3,490	2,260	4,030	2,980	2,420
23	5,980	16,000	29,600	31,000	3,850	14,100	4,520	3,400	2,340	5,980	2,900	2,180
24	4,720	14,600	23,200	32,300	3,850	5,980	5,320	3,310	3,140	5,120	2,820	5,020
25	4,520	16,800	18,000	31,000	3,580	4,720	5,870	3,060	7,120	4,320	2,740	9,380
26	5,020	18,600	14,300	30,000	3,400	5,320	4,520	2,980	8,340	3,140	2,580	10,500
27	4,320	20,500	13,000	27,500	3,140	7,840	3,940	3,580	9,250	2,340	2,580	11,000
28	4,030	22,800	13,300	23,800	3,140	9,380	3,490	3,580	9,660	2,420	2,580	9,380
29	4,720	22,200	13,600	19,700	3,850	11,100	3,060	3,140	6,640	2,580	2,580	6,880
30	4,920	....	13,100	15,100	4,030	12,000	2,900	2,660	5,020	2,660	3,140	6,090
31	7,600	....	12,300	....	6,310	....	2,580	2,420	....	2,580	....	4,320

NOTE.—Daily discharge computed from a rating curve fairly well defined between 1,800 and 32,300 second-feet.

Monthly discharge of Oconee River at Dublin, Ga., for 1912.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	18,400	4,030	9,760	A.
February	22,800	4,120	12,200	A.
March	43,900	12,300	21,300	B.
April	32,300	5,870	15,800	A.
May	16,800	3,140	7,540	A.
June	31,000	4,720	13,000	A.
July	17,800	2,580	8,330	A.
August	7,720	2,420	3,790	A.
September	9,660	1,400	3,790	B.
October	5,980	2,020	3,120	A.
November	13,000	2,420	4,260	A.
December	11,000	2,180	4,300	A.
The year	43,900	1,400	8,910	

EASTERN GULF OF MEXICO DRAINAGE BASINS.

APALACHICOLA RIVER BASIN.

CHATTAHOOCHEE RIVER NEAR NORCROSS, GA.

Location.—At Medlock's bridge, 4½ miles north of Norcross, Ga., 1½ miles above the mouth of John Creek, and about 5 miles above Suwanee Creek.

Records available.—January 9, 1903, to December 31, 1912.

Drainage area.—1,170 square miles.

Gage.—Standard chain gage on the toll bridge. The original gage was a vertical staff attached to an oak tree on the right bank, about 100 feet above the bridge. A chain gage, established March 14, 1903, was read in connection with the vertical gage until June 28, 1905, when the present gage was installed. The datum of the vertical staff gage originally used and that of the present chain gage has not been changed.

Channel.—The right bank is high and overflows only slightly; the left bank will overflow for about 800 feet at a gage height of 16 to 18 feet. The bed of the stream is sandy and changeable, necessitating frequent discharge measurements and occasional changes in the rating.

Discharge measurements.—Made from the downstream side of the bridge.

Artificial control.—Dams near Gainesville, Ga., and on Chestatee River interfere with the natural flow. It is thought that the two readings a day give a good daily mean gage height.

Accuracy.—Except for possible error in mean gage heights due to artificial control, the results at this station are considered excellent.

Cooperation.—Since May 1, 1910, the gage heights have been furnished by the United States Weather Bureau.

The following discharge measurement was made by W. E. Hall:

June 14, 1912, gage height, 8.27 feet; discharge, 7,580 second-feet.

Several measurements made early in 1913 were used in determining the discharge rating for 1912.

Daily gage height, in feet, of Chattahoochee River near Norcross, Ga., for 1912.

[W. O. Medlock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.6	5.0	4.8	6.2	5.7	3.9	3.8	3.3	2.4	2.8	2.6	2.4
2	5.0	4.2	4.4	5.8	5.0	3.7	3.6	3.0	2.4	2.6	2.8	2.3
3	4.3	3.8	4.2	5.6	4.7	3.7	4.1	2.9	2.4	2.6	2.8	2.6
4	4.2	3.6	4.8	5.2	4.7	4.7	4.0	3.5	2.4	4.8	2.6	2.7
5	3.7	3.5	4.7	4.9	4.8	3.9	4.6	3.4	2.4	5.4	2.6	2.7
6	3.4	3.4	7.0	4.8	4.4	4.1	5.8	3.0	2.4	3.3	2.6	3.0
7	3.3	3.3	6.0	4.7	5.0	4.7	5.0	2.9	2.4	2.9	2.8	3.4
8	3.4	3.2	5.0	4.7	4.8	4.2	4.1	3.0	2.3	2.8	3.2	2.9
9	3.7	3.2	4.6	4.6	4.3	3.8	4.2	6.0	2.5	2.6	3.0	2.7
10	4.0	3.2	4.3	4.3	4.2	3.5	6.2	5.4	2.4	2.6	2.7	2.7
11	3.6	3.1	4.2	4.4	4.2	3.4	8.0	3.9	2.5	2.5	2.6	2.6
12	3.5	3.1	4.2	4.4	4.2	3.3	5.5	3.4	2.4	2.5	2.7	2.6
13	3.4	3.1	4.3	4.3	3.9	3.1	4.6	3.1	2.5	2.5	2.6	2.6
14	3.2	3.2	4.1	4.3	3.9	12.5	4.2	3.0	2.5	2.5	3.1	2.5
15	3.1	5.7	14.5	4.3	3.8	9.2	4.4	2.9	3.1	2.5	2.6	2.5
16	3.1	9.2	18.6	8.2	3.8	7.6	3.9	3.0	3.8	2.6	2.6	2.3
17	3.0	5.6	10.2	6.9	4.0	5.0	4.2	3.2	2.9	2.5	2.5	2.5
18	3.0	4.6	6.5	5.9	3.8	4.2	5.4	2.9	2.4	2.4	2.5	2.5
19	3.2	4.5	5.8	5.0	3.5	3.9	4.5	3.0	2.5	3.8	2.6	2.5
20	3.4	4.1	5.3	4.7	3.6	3.6	5.2	2.9	2.4	7.6	2.4	2.5
21	3.1	6.4	5.2	5.0	3.6	3.4	4.4	2.8	2.3	4.2	2.4	2.5
22	3.0	8.4	5.0	8.4	3.6	3.4	4.2	2.7	2.3	3.4	2.4	2.4
23	3.0	5.4	4.8	11.0	3.4	3.2	3.8	2.8	4.6	3.1	2.4	2.4
24	2.9	5.2	6.9	6.2	3.4	3.6	3.6	2.9	6.1	2.9	2.4	3.2
25	2.8	6.4	7.9	5.1	3.4	8.0	3.8	2.7	3.5	2.7	2.4	3.3
26	2.8	10.0	5.8	4.9	3.3	7.6	3.4	3.6	3.0	2.7	2.4	2.9
27	2.8	9.4	5.2	4.9	3.3	5.6	3.2	3.0	3.2	2.6	2.4	2.7
28	2.7	6.8	5.2	6.0	5.0	4.2	3.2	2.6	3.3	2.6	2.4	2.7
29	6.2	5.4	11.4	5.2	5.6	4.0	3.0	2.6	3.4	2.6	2.4	2.6
30	11.7	......	12.9	6.2	6.9	3.8	3.0	2.5	2.9	2.6	2.4	2.6
31	7.4	......	7.1	......	4.5	......	3.0	2.5	......	2.6	......	2.9

Daily discharge, in second-feet, of Chattahoochee River near Norcross, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7,090	3,750	3,530	5,210	4,590	2,610	2,520	2,070	1,320	1,640	1,480	1,320
2	3,750	2,900	3,100	4,710	3,750	2,430	2,340	1,800	1,320	1,480	1,640	1,240
3	3,000	2,520	2,900	4,470	3,420	2,430	2,800	1,720	1,320	1,480	1,640	1,480
4	2,900	2,340	3,530	3,990	3,420	3,420	2,700	2,250	1,320	3,530	1,480	1,560
5	2,430	2,250	3,420	3,640	3,530	2,610	3,310	2,160	1,320	4,230	1,480	1,560
6	2,160	2,160	6,250	3,530	3,100	2,800	4,710	1,800	1,320	2,070	1,480	1,800
7	2,070	2,070	4,950	3,420	3,750	3,420	3,750	1,720	1,320	1,720	1,640	2,160
8	2,160	1,980	3,750	3,420	3,530	2,900	2,800	1,800	1,240	1,640	1,980	1,720
9	2,430	1,980	3,310	3,310	3,000	2,520	2,900	4,950	1,400	1,480	1,800	1,560
10	2,700	1,980	3,000	3,000	2,900	2,250	5,210	4,230	1,320	1,480	1,560	1,560
11	2,340	1,890	2,900	3,100	2,900	2,160	7,650	2,610	1,400	1,400	1,480	1,480
12	2,250	1,890	2,900	3,100	2,900	2,070	4,350	2,160	1,320	1,400	1,560	1,480
13	2,160	1,890	3,000	3,000	2,610	1,890	3,310	1,890	1,400	1,400	1,480	1,480
14	1,980	1,980	2,800	3,000	2,610	14,500	2,900	1,800	1,400	1,400	1,890	1,400
15	1,890	4,590	17,800	3,000	2,520	9,400	3,100	1,720	1,890	1,400	1,480	1,400
16	1,890	9,400	25,100	7,930	2,520	7,090	2,610	1,800	2,520	1,480	1,480	1,240
17	1,800	4,470	10,900	6,120	2,700	3,750	2,900	1,980	1,720	1,400	1,400	1,400
18	1,800	3,310	5,600	4,830	2,520	2,900	4,230	1,720	1,320	1,320	1,400	1,400
19	1,980	3,200	4,710	3,750	2,250	2,610	3,200	1,800	1,400	2,520	1,480	1,400
20	2,160	2,800	4,110	3,420	2,340	2,340	3,990	1,720	1,320	7,090	1,320	1,400
21	1,890	5,470	3,990	3,750	2,340	2,160	3,100	1,640	1,240	2,900	1,320	1,400
22	1,800	8,210	3,750	8,210	2,340	2,160	2,900	1,560	1,240	2,160	1,320	1,320
23	1,800	4,230	3,530	12,100	2,160	1,980	2,520	1,640	3,310	1,890	1,320	1,320
24	1,720	3,990	6,120	5,210	2,160	2,340	2,340	1,720	5,080	1,720	1,320	1,980
25	1,640	5,470	7,510	3,870	2,160	7,650	2,520	1,560	2,250	1,560	1,320	2,070
26	1,640	10,600	4,710	3,640	2,070	7,090	2,160	2,340	1,800	1,560	1,320	1,720
27	1,640	9,700	3,990	3,640	2,070	4,470	1,980	1,800	1,980	1,480	1,320	1,560
28	1,560	5,990	3,990	4,950	3,750	2,900	1,980	1,480	2,070	1,480	1,320	1,560
29	5,210	4,230	12,700	3,990	4,470	2,700	1,800	1,480	2,160	1,480	1,320	1,480
30	13,200	......	15,100	5,210	6,120	2,520	1,800	1,400	1,720	1,480	1,320	1,480
31	6,810	......	6,390	......	3,200	......	1,800	1,400	......	1,480	......	1,720

NOTE.—Daily discharge computed from a rating curve well defined below 8,000 second-feet and fairly well defined below 15,000 second-feet.

Monthly discharge of Chattahoochee River near Norcross, Ga., for 1912.

[Drainage area, 1,170 square miles.]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	13,200	1,560	2,900	A.
February	10,600	1,890	4,040	A.
March	25,100	2,800	6,110	B.
April	12,100	3,000	4,480	A.
May	6,120	2,070	3,020	A.
June	14,500	1,890	3,740	A.
July	7,650	1,800	3,100	A.
August	4,950	1,400	1,990	A.
September	5,080	1,240	1,720	A.
October	7,090	1,320	1,960	A.
November	1,980	1,320	1,480	A.
December	2,160	1,240	1,540	A.
The year	25,100	1,240	3,000	

CHATTAHOOCHEE RIVER AT WEST POINT, GA.

Location.—At the Montgomery Street Bridge, West Point, Ga., until October 21, 1912; after that date at a point about a mile upstream, just below the mouth of Oseligee Creek, about 300 feet east of the West Point waterworks pumping plant, and about 4 miles above Long Cane Creek.

Records available.—July 30, 1896, to December 31, 1912.

Drainage area.—3,300 square miles.

Gage.—The new staff gage is at a different datum from the chain gage formerly used and is in two sections; the lower section, reading from 0 to 6 feet, is near the right bank; the upper section, reading from 6 to 25 feet, is fastened to a tree on the left bank.

Channel.—Rough, rocky bottom and fairly permanent section; banks are overflowed at high stages.

Discharge measurements.—May be made from a boat at a section near the new gage, or from the highway bridge where the gage was formerly located; no tributaries enter between the two sections.

Artificial control.—The operation of power plants at points above causes some diurnal fluctuation. The Langdale Dam, 5 miles below the station, forms a pond reaching back as far as West Point. This affected the gage heights at the highway bridge, making the old rating valueless for 1912. The new gage established in October, 1912, is not affected by backwater.

Accuracy.—A new rating was developed for the old gage at the highway bridge applying to the changed conditions during 1912. A rating has also been developed for the new staff gage covering low and medium stages. Discharges computed from the two ratings for the period October 21 to December 31, 1912, agree within 0.2 per cent.

Cooperation.—Gage heights after October 21, 1912, have been furnished by the Columbus Power Co., of Columbus, Ga. The hydraulic engineer for that company has also assisted in making discharge measurements.

Discharge measurements of Chattahoochee River at West Point, Ga., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 25[a]	W. E. Hall........	[b] 4.01	4,320	Sept. 19	Columbus Power Co.	3.80	4,120
Aug. 26	Columbus Power Co.	4.50	6,000	24	.....do.............	4.50	5,650
31	.....do.............	3.20	3,050	Oct. 21	.....do.............	5.60	8,400
Sept. 6	.....do.............	2.90	2,560	Nov. 21	Hall and King.....	2.99	2,650
18	.....do.............	3.40	3,360	30[a]	W. E. Hall........	2.94	2,560

[a] Measurement made from highway bridge at old station.

[b] Gage height taken at old gage on highway bridge.

NOTE.—Measurements made from boat at new station except as noted. Gage heights refer to new staff gage except as noted. Additional measurements made early in 1913 were used in determining the ratings.

Daily gage height, in feet, of Chattahoochee River at West Point, Ga., for 1912.

[E. N. Dunn and J. H. Miller, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	11.4	6.5	11.9	6.4	5.5	4.9	3.3	2.7	3.6	3.2	3.2
2	5.9	7.5	5.7	7.5	6.4	4.3	4.8	3.1	2.6	3.6	3.1	3.1
3	6.7	5.6	5.4	6.5	5.8	3.9	5.4	3.4	2.6	3.2	3.1	2.9
4	5.8	5.0	5.6	6.0	6.2	4.6	5.6	4.2	2.5	4.6	3.2	3.2
5	5.4	4.4	6.0	5.7	7.2	4.7	5.6	3.7	2.6	6.4	2.9	4.2
6	5.0	4.2	8.6	5.4	6.2	5.0	6.5	3.4	2.6	6.0	3.3	4.0
7	4.7	4.0	8.6	5.4	6.3	5.4	7.0	3.5	3.0	4.9	3.5	3.9
8	5.0	4.0	7.7	5.2	7.2	6.3	5.4	6.0	3.2	4.0	3.7	3.9
9	7.8	3.9	6.8	5.2	6.6	5.1	5.3	5.1	2.8	3.7	3.5	3.9
10	7.1	4.0	6.2	5.1	5.4	4.2	6.2	5.6	2.7	3.2	3.5	3.6
11	5.8	4.4	5.6	5.0	4.9	4.0	6.4	7.5	2.8	3.3	3.4	3.6
12	5.2	4.2	6.1	4.9	5.1	3.7	6.8	5.9	3.0	3.4	3.2	3.5
13	4.8	3.9	6.0	5.1	5.1	3.6	7.8	4.4	3.0	3.4	3.4	3.4
14	4.6	4.4	5.5	5.0	4.9	15.2	7.0	3.8	3.1	3.5	3.2	3.2
15	4.3	7.2	20.0	4.7	4.5	17.7	6.0	3.6	3.2	3.2	3.2	3.3
16	4.2	9.4	22.7	5.3	4.4	14.8	5.0	3.5	3.4	3.4	3.3	3.3
17	4.0	8.8	19.4	11.6	4.4	12.4	5.8	3.4	3.6	3.1	3.4	3.0
18	4.0	8.1	17.6	12.6	4.3	7.4	5.8	3.8	3.7	3.3	3.3	3.4
19	4.2	6.0	15.4	9.7	4.4	5.4	5.6	4.5	3.7	3.8	2.8	3.3
20	4.6	5.4	7.1	8.2	4.0	4.6	5.2	3.9	3.0	5.3	3.3	3.3
21	4.4	6.4	6.4	10.6	4.0	4.2	4.8	3.5	3.0	5.3	3.1	3.3
22	4.2	9.9	6.0	10.8	3.9	4.0	4.6	3.4	3.2	5.6	3.0	3.3
23	3.9	9.4	5.7	14.0	3.8	3.9	4.3	3.6	5.2	4.1	3.1	3.7
24	3.9	9.0	7.6	12.0	3.8	3.8	4.1	3.2	4.8	3.8	3.0	5.2
25	4.0	10.0	9.6	10.2	3.8	7.2	3.8	3.1	5.6	3.5	3.1	5.2
26	3.6	8.8	8.6	6.7	3.8	12.0	3.8	4.2	5.0	3.4	2.7	4.4
27	3.8	9.4	7.2	5.9	3.7	10.8	3.9	3.5	3.8	3.3	3.1	4.1
28	3.8	9.6	6.2	6.5	3.5	7.6	3.6	3.3	3.8	3.3	3.0	4.1
29	10.5	8.3	11.8	6.6	4.1	5.6	3.4	3.2	3.8	3.1	3.1	4.5
30	14.4	......	13.5	7.4	5.6	4.9	3.8	2.8	4.0	3.2	3.0	3.7
31	13.0	......	12.3	......	6.4	......	3.2	2.8	......	3.1	......	3.7

NOTE.—Gage heights Jan. 1 to Oct. 20, 1912, taken at the old station at Montgomery Street Bridge. Oct. 21 to Dec. 31, 1912, the gage heights taken at the new station one-half mile farther upstream.

Daily discharge, in second-feet, of Chattahoochee River at West Point, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8,250	23,400	9,980	24,900	9,730	7,530	6,160	3,000	1,990	3,560	2,990	2,990
2	8,490	12,600	8,010	12,600	9,730	4,900	5,940	2,640	1,840	3,560	2,830	2,830
3	10,500	7,770	7,300	9,980	8,250	4,130	7,300	3,180	1,840	2,820	2,830	2,540
4	8,250	6,380	7,770	8,730	9,320	5,510	7,770	4,700	1,700	5,510	2,990	2,990
5	7,300	5,100	8,730	8,010	11,800	5,720	7,770	3,750	1,840	9,730	2,540	5,080
6	6,380	4,700	15,400	7,300	9,320	6,380	9,980	3,180	1,840	8,730	3,160	4,600
7	5,720	4,320	15,400	7,300	9,480	7,300	11,300	3,370	2,470	6,160	3,530	4,370
8	6,380	4,320	13,100	6,840	11,800	9,480	7,300	8,730	2,820	4,320	3,940	4,370
9	13,300	4,130	10,700	6,840	10,200	6,610	7,070	6,610	2,140	3,750	3,530	4,370
10	11,500	4,320	9,320	6,610	7,300	4,700	9,320	7,770	1,990	2,820	3,530	3,730
11	8,250	5,100	7,770	6,380	6,160	4,320	9,730	12,600	2,140	3,000	3,340	3,730
12	6,840	4,700	8,980	6,160	6,610	3,750	10,700	8,490	2,470	3,180	2,990	3,530
13	5,940	4,130	8,730	6,610	6,610	3,560	13,300	5,100	2,470	3,180	3,340	3,340
14	5,510	5,100	7,530	6,380	6,160	35,500	11,300	3,940	2,640	3,370	2,990	2,990
15	4,900	11,800	52,200	5,720	5,300	44,200	8,730	3,560	2,820	2,820	2,990	3,160
16	4,700	17,600	61,600	7,070	5,100	34,100	6,380	3,370	3,180	3,180	3,160	3,160
17	4,320	16,000	50,100	24,000	5,100	26,400	8,250	3,180	3,560	2,640	3,340	2,680
18	4,320	14,100	43,800	27,100	4,900	12,300	8,250	3,940	3,750	3,000	3,160	3,340
19	4,700	8,730	36,200	18,400	5,100	7,300	7,770	5,300	3,750	2,940	2,400	3,160
20	5,510	7,300	11,500	14,400	4,320	5,510	6,840	4,130	2,470	7,070	3,160	3,160
21	5,100	9,730	9,730	21,000	4,320	4,700	5,940	3,370	2,470	7,720	2,830	3,160
22	4,700	19,000	8,730	21,600	4,130	4,320	5,510	3,180	2,820	8,440	2,680	3,160
23	4,130	17,600	8,010	31,500	3,940	4,130	4,900	3,560	6,840	4,840	2,830	3,940
24	4,130	16,500	12,800	25,200	3,940	3,940	4,510	2,820	5,940	4,150	2,680	7,480
25	4,320	19,300	18,200	19,800	3,940	11,800	3,940	2,640	7,770	3,530	2,830	7,480
26	3,560	16,000	15,400	10,500	3,940	25,200	3,940	4,700	6,380	3,340	2,260	5,560
27	3,940	17,600	11,800	8,490	3,750	21,600	4,130	3,370	3,940	3,160	2,830	4,840
28	3,940	18,200	9,320	9,980	3,370	12,800	3,560	3,000	3,940	3,160	2,680	4,840
29	20,700	14,600	24,600	10,200	4,510	7,770	3,180	2,820	3,940	2,830	2,830	5,800
30	32,800	....	29,900	12,300	7,770	6,160	3,940	2,140	4,320	2,990	2,680	3,940
31	28,300	....	26,100	....	9,730	....	2,820	2,140	....	2,830	....	3,940

NOTE.—Daily discharge Jan. 1 to Oct. 20, 1912, computed from a rating curve for the old station at the Montgomery Street Bridge, the rating curve for this period being fairly well defined below 20,000 second-feet. Daily discharge Oct. 21 to Dec. 31, 1912, computed from a well-defined rating curve for the new station one-half mile farther upstream.

Monthly discharge of Chattahoochee River at West Point, Ga., for 1912.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	32,800	3,560	8,280	B.
February	23,400	4,130	11,000	B.
March	61,600	7,300	18,300	C.
April	31,500	5,720	13,100	B.
May	11,800	3,370	6,630	B.
June	44,200	3,560	11,400	B.
July	13,300	2,820	7,020	B.
August	12,600	2,140	4,330	B.
September	7,770	1,700	3,270	B.
October	9,730	2,640	4,270	A.
November	3,940	2,260	3,000	A.
December	7,480	2,540	4,010	A.
The year	61,600	1,700	7,870	

CHATTAHOOCHEE RIVER AT COLUMBUS, GA.

Location.—Behind the Columbus Gas Works between Columbus, Ga., and Girard, Ala., just below mouth of Hollands Creek and about half a mile below Eagle and Phoenix dam.

Records available.—September 3 to December 31, 1912.

Gage.—Vertical staff on left bank 600 feet above new concrete highway bridge and about 800 feet above steamboat landing. Zero of gage, 185 feet above sea level.

Channel.—Deep near left bank and gradually shallowing near the right bank; bed smooth and sandy and will probably shift at every flood; left bank high; overflows about 75 feet back to a secondary bank, which is not overflowed. At low stages the right bank is a large sand bar about 300 feet wide; the sand is deposited by Hollands Creek and the bar is changed at every flood. Current swift at all stages.

Discharge measurements.—Made from boat. A light steel cable is stretched from the left bank to the sand bar; cable is fastened to trees on the left bank and rests on an A-frame on the sand bar; a tag line is stretched just below the cable.

Winter flow.—Not affected by ice.

Artificial control.—The operation of dams above the station causes constant fluctuation in gage heights.

Accuracy.—Conditions very poor and many measurements must be made to insure accurate results.

Cooperation.—The gage heights and discharge measurements have all been furnished by the Columbus Power Co.

Discharge measurements of Chattahoochee River at Columbus, Ga., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Sept. 5	Columbus Power Co.	4.10	3,310	Oct. 3	Columbus Power Co.	4.00	3,200
8	do	2.20	1,420	12	do	3.00	2,450
11	do	4.60	4,050	14	do	5.00	5,100
26	do	8.10	8,860	Dec. 18	do	2.96	2,640

Daily gage height, in feet, and discharge, in second-feet, of Chattahoochee River at Columbus, Ga., for 1912.

Day.	Dec.		Day.	Dec.		Day.	Dec.	
	Gage height.	Discharge.		Gage height.	Discharge.		Gage height.	Discharge.
1	3.4	3,100	11	4.7	4,650	21	4.2	4,020
2	4.0	3,780	12	4.7	4,650	22	4.1	3,900
3	3.6	3,320	13	4.3	4,140	23	5.3	5,430
4	3.6	3,320	14	3.8	3,540	24	10.1	12,400
5	5.3	5,430	15	3.9	3,660	25		10,800
6	6.8	7,520	16	4.5	4,390	26	8.0	9,300
7	5.6	5,840	17	4.3	4,140	27	6.6	7,240
8	5.6	5,840	18	3.6	3,320	28	6.8	7,520
9	5.6	5,840	19	4.4	4,260	29	6.0	6,400
10	5.0	5,040	20	4.2	4,020	30	5.7	5,980
						31	5.7	5,980

CHATTAHOOCHEE RIVER AT ALAGA, ALA.

Location.—At the Atlantic Coast Line Railway bridge one-fourth mile east of Alaga, 4 miles east of Gordon, and one-half mile west of Saffold, Ga.; about 35 miles above the junction of Chattahoochee and Flint rivers.

Records available.—Gage heights from January 1, 1908, to December 31, 1912.

Drainage area.—8,780 square miles. (United States Weather Bureau figures.)

Gage.—Standard chain gage attached to the railroad bridge; datum unchanged since 1908.

Channel.—Shifting; lack of conformity in discharge measurements indicates much change.

Discharge measurements.—Made from the railroad bridge. No discharge measurements were made at this station during 1912.

Accuracy.—No rating has yet been developed.

Cooperation.—The gage heights have been furnished by the United States Weather Bureau.

Daily gage height, in feet, of Chattahoochee River at Alaga, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.9	29.7	17.6	25.6	16.5	7.6	11.2	5.0	5.1	6.8	3.6	4.1
2	16.9	28.6	15.5	23.0	16.9	10.1	9.3	5.2	4.3	6.7	4.0	4.5
3	15.9	23.3	13.1	21.2	14.9	9.8	9.6	6.1	3.3	6.2	4.3	4.3
4	15.5	16.1	12.0	16.9	14.2	8.3	10.4	10.0	3.9	5.5	4.3	4.4
5	15.9	12.2	12.1	13.6	16.4	8.4	10.7	9.9	4.6	5.3	3.3	4.9
6	13.9	10.4	14.2	12.5	14.7	8.1	9.9	7.3	4.1	5.0	4.0	5.8
7	11.3	9.3	19.8	11.8	15.9	9.2	9.7	7.7	3.6	9.0	9.0	7.5
8	10.3	8.5	20.5	11.2	16.2	13.3	9.8	6.8	3.8	9.2	12.4	8.6
9	21.3	8.1	18.6	10.9	15.2	12.7	10.7	8.1	3.8	8.6	9.9	7.5
10	25.3	7.9	16.0	10.7	15.0	11.9	12.7	12.0	3.2	6.4	7.7	6.6
11	22.8	7.7	14.9	10.8	13.8	10.4	12.4	11.9	3.4	5.3	6.9	6.5
12	18.7	7.3	14.3	10.8	12.2	8.8	12.3	11.9	4.0	4.8	6.2	5.8
13	14.8	8.2	19.9	10.9	12.2	7.6	11.5	13.7	4.2	4.2	5.9	5.6
14	12.7	8.9	20.3	11.2	11.4	7.4	11.8	12.6	4.1	4.4	4.6	5.6
15	11.3	8.8	18.6	10.9	10.9	7.1	13.3	9.7	4.2	9.4	5.3	5.4
16	10.0	10.7	31.1	10.5	10.2	18.6	12.4	7.5	4.7	9.2	4.5	4.8
17	9.2	11.3	36.0	10.9	9.5	24.4	10.7	6.7	4.4	7.1	4.0	4.6
18	8.6	16.1	37.7	21.8	8.9	24.5	11.7	6.8	4.0	5.7	3.8	4.8
19	8.3	15.1	38.1	30.2	9.0	21.2	16.6	8.5	5.1	5.6	3.3	5.1
20	8.3	14.3	37.1	30.4	8.5	14.4	12.3	7.9	6.9	9.1	2.9	4.7
21	8.9	12.1	34.3	32.7	8.0	10.5	10.7	8.0	6.0	8.8	3.6	4.4
22	8.9	15.9	25.7	37.5	8.3	8.5	9.7	8.5	5.0	9.2	3.8	4.8
23	8.5	19.4	16.7	38.9	7.6	7.6	8.5	7.7	5.5	8.9	3.8	4.9
24	7.8	20.1	14.4	38.5	7.7	6.9	8.1	8.2	6.0	9.1	3.9	8.5
25	7.2	22.1	16.3	36.9	7.2	7.1	7.3	7.7	8.4	8.7	4.0	16.7
26	6.9	25.5	21.5	32.2	7.7	10.1	6.9	7.0	8.0	6.8	3.7	15.9
27	6.8	24.4	21.6	26.3	6.9	11.0	6.7	7.7	7.2	5.5	3.4	13.0
28	6.6	21.2	18.2	18.9	6.5	17.4	7.0	7.6	8.5	4.9	4.0	11.8
29	6.3	18.8	15.8	15.6	7.1	17.8	6.3	7.2	7.2	4.6	4.2	10.2
30	10.0	....	18.7	15.1	7.1	14.2	5.9	5.8	6.7	4.5	3.6	9.5
31	25.0	....	24.4	....	7.5	....	5.5	5.5	....	4.4	....	8.5

FLINT RIVER NEAR WOODBURY, GA.

Location.—At the Macon & Birmingham Railroad bridge, 3 miles east of Woodbury, Ga., about one-third of a mile above the mouth of Cane Creek and one-fourth of a mile below Elkins Creek.

Records available.—March 29, 1900, to December 31, 1912.

Drainage area.—1,090 square miles.

Gage.—Vertical staff, in two sections, on the left bank about 300 feet above the railroad bridge. The datum of the gage, which is 660 feet above sea level, has remained the same since the establishment of the station.

Channel.—The bottom is rough, consisting chiefly of rock, and currents are irregular. Above gage height 10 feet the banks are subject to overflow for a width of about 350 feet, but all water passes beneath the bridge and its approaches.

Discharge measurements.—Made from the downstream side of the railroad bridge, which does not make a right angle with the current.

Artificial control.—Power developments on tributary streams above affect the daily flow at low stages.

Accuracy.—Since July 1, 1910, the records are based on one gage height reading a day, and as the operation of the power plants above causes some diurnal fluctuation the estimates of daily discharge may be considerably in error for individual days, especially at low stages. The discharge rating was fairly constant for a number of years, but changed considerably in 1909 and 1910, probably due to conditions at the shoals one-half mile below. The highway bridge built a short distance below the gage in September, 1911, materially affected the conditions of flow and necessitated a new discharge rating.

Cooperation.—Since July 1, 1910, the gage heights have been furnished by the United States Weather Bureau.

The following discharge measurement was made by W. E. Hall:

August 24, 1912, gage height, 0.93 foot; discharge, 650 second-feet.

An additional measurement made early in 1913 was used in determining the discharge rating for 1912.

Daily gage height, in feet, of Flint River near Woodbury, Ga., for 1912.

[E. T. Riggins, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.5	5.7	2.4	3.9	2.4	1.3	1.5	0.8	0.5	1.5	0.75	0.9
2	2.3	4.3	2.1	3.1	2.3	1.0	1.4	.8	.4	1.1	.7	.9
3	2.4	3.1	1.8	2.5	2.1	1.0	1.4	.6	.4	1.0	7	.9
4	2.3	2.2	2.4	2.3	2.0	.9	1.6	.8	.3	1.1	.7	.9
5	2.1	1.8	2.3	1.8	3.2	1.5	1.8	.7	1.9	1.4	.7	1.0
6	1.8	1.6	3.5	1.7	4.4	1.3	1.9	.7	1.2	2.1	.75	1.55
7	1.7	1.5	3.7	1.6	4.5	2.6	1.5	.6	.9	2.0	1.2	1.6
8	1.7	1.4	3.6	1.6	4.4	2.9	1.3	1.5	.6	1.8	1.6	1.5
9	3.5	1.4	3.1	1.6	5.5	2.5	1.6	3.1	.5	1.35	1.25	1.4
10	3.6	1.4	2.7	1.5	4.0	2.0	2.4	2.1	.5	.9	1.1	1.4
11	3.3	1.6	2.3	1.6	2.9	1.8	2.2	1.8	.5	.8	1.05	1.3
12	2.8	1.7	2.6	1.5	2.1	1.6	2.1	1.9	.7	.8	1.0	1.1
13	2.2	1.7	2.8	1.5	2.0	1.1	2.1	1.7	.8	.75	.9	1.0
14	2.0	1.5	2.5	1.5	1.8	1.7	3.3	1.2	.7	.85	.85	1.0
15	1.7	3.1	6.9	1.5	1.5	3.8	2.0	1.1	.9	.9	.85	1.0
16	1.6	3.8	13.1	1.8	1.5	5.3	1.7	.9	.8	.85	.9	.9
17	1.4	4.2	12.9	3.6	1.6	4.4	1.6	.8	.7	.9	.8	.9
18	1.3	3.9	10.1	5.9	1.4	3.0	2.6	1.1	.7	.85	.8	.95
19	1.8	3.3	6.9	6.1	1.3	1.7	3.7	1.3	.8	1.2	.8	1.0
20	1.9	2.5	3.5	5.8	1.3	1.3	2.7	1.3	.7	1.65	.8	1.05
21	1.7	2.8	2.5	6.5	1.1	1.1	2.0	1.2	.7	1.5	.8	1.0
22	1.6	4.8	2.2	6.0	1.1	1.0	1.8	1.1	.8	1.25	.8	1.0
23	1.4	4.4	2.0	8.5	1.1	.9	1.6	.8	1.2	1.1	.8	1.25
24	1.3	4.0	2.5	6.6	1.0	.9	1.1	.8	1.7	1.0	.8	2.4
25	1.3	5.0	3.9	5.3	1.0	1.3	1.0	1.0	1.5	.9	.8	2.4
26	1.3	4.8	3.5	3.8	.9	3.4	1.0	.7	1.2	.8	.8	2.2
27	1.2	4.6	3.1	2.7	.9	4.4	1.0	.7	.9	.75	.8	2.0
28	1.2	3.7	2.5	2.2	1.2	4.3	.9	.8	.8	.7	.8	1.9
29	2.2	3.0	4.7	2.0	1.0	3.4	.8	.7	1.0	.7	.9	1.65
30	6.4	......	5.6	2.7	1.3	2.0	.7	.6	1.2	.7	.9	1.5
31	6.3	......	4.9	......	1.4	......	.7	.5	......	.7	......	1.5

Daily discharge, in second-feet, of Flint River near Woodbury, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,310	7,550	2,180	4,350	2,180	1,040	1,220	620	424	1,220	584	700
2	2,050	4,980	1,810	3,150	2,050	785	1,130	620	371	870	548	700
3	2,180	3,150	1,490	2,310	1,810	785	1,130	483	371	785	548	700
4	2,050	1,930	2,180	2,050	1,700	700	1,310	620	323	870	548	700
5	1,810	1,490	2,050	1,490	3,300	1,220	1,490	548	1,590	1,130	548	785
6	1,490	1,310	3,750	1,400	5,150	1,040	1,590	548	955	1,810	584	1,260
7	1,400	1,220	4,050	1,310	5,320	2,440	1,220	483	700	1,700	955	1,310
8	1,400	1,130	3,900	1,310	5,150	2,860	1,040	1,220	483	1,490	1,310	1,220
9	3,750	1,130	3,150	1,310	7,150	2,310	1,310	3,150	424	1,080	998	1,130
10	3,900	1,130	2,580	1,220	4,500	1,700	2,180	1,810	424	700	870	1,130
11	3,450	1,310	2,050	1,310	2,860	1,490	1,930	1,490	424	620	828	1,040
12	2,720	1,400	2,440	1,220	1,810	1,310	1,810	1,590	548	620	785	870
13	1,930	1,400	2,720	1,220	1,700	870	1,810	1,400	620	584	700	785
14	1,700	1,220	2,310	1,220	1,490	1,400	3,450	955	548	660	660	785
15	1,400	3,150	10,100	1,220	1,220	4,200	1,700	870	700	700	660	785
16	1,310	4,200	26,300	1,490	1,220	6,770	1,400	700	620	660	700	700
17	1,130	4,820	25,700	3,900	1,310	5,150	1,310	620	548	700	620	700
18	1,040	4,350	18,000	7,950	1,130	3,000	2,440	870	548	660	620	742
19	1,490	3,450	10,100	8,360	1,040	1,400	4,050	1,040	620	955	620	785
20	1,590	2,310	3,750	7,750	1,040	1,040	2,580	1,040	548	1,360	620	828
21	1,400	2,720	2,310	9,200	870	870	1,700	955	548	1,220	620	785
22	1,310	5,840	1,930	8,150	870	785	1,490	870	620	998	620	785
23	1,130	5,150	1,700	13,800	870	700	1,310	620	955	870	620	998
24	1,040	4,500	2,310	9,420	785	700	870	620	1,400	785	620	2,180
25	1,040	6,200	4,350	6,770	785	1,040	785	785	1,220	700	620	2,180
26	1,040	5,840	3,750	4,200	700	3,600	785	548	955	620	620	1,930
27	955	5,490	3,150	2,580	700	5,150	785	548	700	584	620	1,700
28	955	4,050	2,310	1,930	955	4,980	700	620	620	548	620	1,590
29	1,930	3,000	5,660	1,700	785	3,600	620	548	785	548	700	1,360
30	8,990	....	7,350	2,580	1,040	1,700	548	483	955	548	700	1,220
31	8,780	....	6,020	....	1,130	....	548	424	....	548	....	1,220

NOTE.—Daily discharge computed from a rating curve fairly well defined between 200 and 24,000 second-feet.

Monthly discharge of Flint River near Woodbury, Ga., for 1912.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	8,990	955	2,220	2.04	2.35	A.
February	7,550	1,130	3,290	3.02	3.26	A.
March	26,300	1,490	5,530	5.07	5.84	A.
April	13,800	1,220	3,860	3.54	3.95	A.
May	7,150	700	2,020	1.85	2.13	A.
June	6,770	700	2,150	1.97	2.20	A.
July	4,050	548	1,490	1.37	1.58	A.
August	3,150	424	893	.819	.94	A.
September	1,590	323	685	.628	.70	A.
October	1,810	548	876	.804	.93	A.
November	1,310	548	689	.632	.71	A.
December	2,180	700	1,080	.991	1.14	A.
The year	26,300	323	2,060	1.89	25.73	

FLINT RIVER NEAR CULLODEN, GA.

Location.—At Grays Ferry, 14 miles southwest of Culloden, Ga., 1½ miles above the mouth of Auchumpkee Creek, and about 3 miles above the old gage near Musella, Ga., which was read for a short time in 1907.

Records available.—July 1 to December 31, 1912.

Drainage area.—2,000 square miles.

Gage.—Vertical timber attached to a willow stump on the left bank just below the ferry landing; datum unchanged.

Channel.—Sandy and likely to shift at the station, but a rock ledge one-half mile below will probably give a permanent control.

Discharge measurements.—Made from the ferryboat.

Discharge measurements of Flint River near Culloden, Ga., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 17	W. E. Hall	3.49	2,060
Aug. 23	....do	2.57	1,260

Daily gage height, in feet, of Flint River near Culloden, Ga., for 1912.

[Walter Blasingame, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.6	8.4	4.9	6.6	4.4	3.4	3.6	2.25	2.1	3.5	2.3	2.5
2	5.1	7.0	4.4	5.8	4.3	3.2	3.2	2.2	2.05	3.1	2.2	2.4
3	5.0	6.2	4.3	5.0	4.2	3.1	3.4	2.1	2.0	2.8	2.2	2.4
4	5.1	4.9	5.7	4.8	4.0	3.4	3.5	2.4	2.0	2.6	2.15	2.4
5	4.5	4.0	5.0	4.0	6.0	4.0	3.4	2.45	2.4	3.4	2.1	2.5
6	4.1	3.8	9.0	3.9	7.4	3.7	3.8	2.4	3.4	3.6	2.1	2.95
7	3.9	3.6	7.3	3.8	6.9	7.1	3.3	2.3	2.9	3.8	2.6	3.2
8	5.6	3.4	6.3	3.7	6.8	6.1	3.2	4.9	2.7	3.5	2.8	3.2
9	8.5	3.4	5.7	3.6	6.6	5.6	3.3	6.4	2.05	3.2	3.0	3.0
10	7.2	3.2	5.4	3.6	6.1	4.0	3.5	6.1	2.05	2.9	2.8	2.8
11	6.0	3.5	5.0	3.7	5.7	3.9	4.3	5.9	2.25	2.45	2.65	2.7
12	5.1	3.6	7.0	3.6	4.1	3.5	4.0	5.2	2.85	2.3	2.5	2.6
13	4.7	3.5	6.1	3.5	3.9	3.1	5.2	4.3	2.5	2.2	2.4	2.5
14	4.3	4.0	5.3	3.5	3.8	2.9	5.4	3.3	2.25	2.45	2.3	2.5
15	4.2	5.3	......	3.4	3.8	2.75	5.1	4.0	2.4	2.5	2.3	2.4
16	3.6	6.1	......	4.3	3.6	7.0	3.6	3.0	2.25	2.6	2.3	2.3
17	3.6	6.5	......	8.3	3.5	6.5	4.1	2.8	2.2	2.5	2.3	2.3
18	3.5	6.2	......	9.5	3.4	6.0	4.9	3.2	2.2	2.4	2.3	2.3
19	3.4	5.5	......	9.4	3.2	4.3	6.0	3.3	2.2	3.4	2.3	2.3
20	3.9	5.0	7.6	9.0	3.2	3.7	5.4	4.1	2.1	4.0	2.3	2.3
21	3.8	4.8	5.5	......	3.0	2.9	4.2	3.8	2.1	3.5	2.3	2.3
22	3.8	8.3	4.9	......	2.9	2.85	3.9	3.6	2.2	3.0	2.3	2.4
23	3.4	7.4	4.2	......	2.9	2.3	3.2	2.6	3.8	2.85	2.3	2.5
24	3.4	6.8	5.9	......	2.85	2.25	2.9	2.6	4.0	2.6	2.3	6.3
25	3.1	9.0	7.9	8.6	2.8	4.5	2.9	3.5	3.6	2.45	2.2	6.0
26	3.0	8.3	6.6	7.7	2.75	5.6	2.85	2.7	3.1	2.4	2.2	5.1
27	3.0	7.7	5.7	5.8	2.6	6.4	2.8	2.6	2.65	2.4	2.2	4.3
28	2.9	6.7	4.9	5.1	2.6	6.6	2.7	2.8	2.5	2.3	2.3	4.1
29	3.4	5.6	9.4	4.9	3.0	6.5	2.5	2.8	2.6	2.2	2.4	3.8
30	9.0	......	9.0	4.6	3.2	4.2	2.45	2.3	2.75	2.2	2.55	3.8
31	9.6	......	6.8	......	3.4	......	2.3	2.2	......	2.2	......	3.6

NOTE.—The maximum gage height reading obtainable from gage is 10 feet. Water was over top of gage Mar. 15 to 19 and Apr. 21 to 24.

Daily discharge, in second-feet, of Flint River near Culloden, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,760	10,500	3,910	6,760	3,220	2,010	2,230	930	810	2,120	970	1,130
2	4,200	7,520	3,220	5,340	3,090	1,790	1,790	890	772	1,690	890	1,050
3	4,050	6,040	3,090	4,050	2,960	1,690	2,010	810	735	1,400	890	1,050
4	4,200	3,910	5,170	3,770	2,700	2,010	2,120	1,050	735	1,220	850	1,050
5	3,350	2,700	4,050	2,700	5,680	2,700	2,010	1,090	1,050	2,010	810	1,130
6	2,830	2,460	12,000	2,580	8,320	2,340	2,460	1,050	2,010	2,230	810	1,540
7	2,580	2,230	8,120	2,460	7,330	7,720	1,900	970	1,490	2,460	1,220	1,790
8	5,000	2,010	6,220	2,340	7,140	5,860	1,790	3,910	1,310	2,120	1,400	1,790
9	10,800	2,010	5,170	2,230	6,760	5,000	1,900	6,400	772	1,790	1,590	1,590
10	7,920	1,790	4,670	2,230	5,860	2,700	2,120	5,860	772	1,490	1,400	1,400
11	5,680	2,120	4,050	2,340	5,170	2,580	3,090	5,510	930	1,090	1,260	1,310
12	4,200	2,230	7,520	2,230	2,830	2,120	2,700	4,350	1,440	970	1,130	1,220
13	3,630	2,120	5,860	2,120	2,580	1,690	4,350	3,090	1,130	890	1,050	1,130
14	3,090	2,700	4,510	2,120	2,460	1,490	4,670	1,900	930	1,090	970	1,130
15	2,960	4,510	(*a*)	2,010	2,460	1,360	4,200	2,700	1,050	1,130	970	1,050
16	2,230	5,860	(*a*)	3,090	2,230	7,520	2,230	1,590	930	1,220	970	970
17	2,230	6,580	(*a*)	10,300	2,120	6,580	2,830	1,400	890	1,130	970	970
18	2,120	6,040	(*a*)	13,200	2,010	5,680	3,910	1,790	890	1,050	970	970
19	2,010	4,830	(*a*)	13,000	1,790	3,090	5,680	1,900	890	2,010	970	970
20	2,580	4,050	8,740	12,000	1,790	2,340	4,670	2,830	810	2,700	970	970
21	2,460	3,770	4,830	(*b*)	1,590	1,490	2,960	2,460	810	2,120	970	970
22	2,460	10,300	3,910	(*b*)	1,490	1,440	2,580	2,230	890	1,590	970	1,050
23	2,010	8,230	2,960	(*b*)	1,490	970	1,790	1,220	2,460	1,440	970	1,130
24	2,010	7,140	5,510	(*b*)	1,440	930	1,490	1,220	2,700	1,220	970	6,220
25	1,690	12,000	9,390	11,000	1,400	3,350	1,490	2,120	2,230	1,090	890	5,680
26	1,590	10,300	6,760	8,950	1,360	5,000	1,440	1,310	1,690	1,050	890	4,200
27	1,590	8,950	5,170	5,340	1,220	6,400	1,400	1,220	1,260	1,050	890	3,090
28	1,490	6,950	3,910	4,200	1,220	6,760	1,310	1,400	1,130	970	970	2,830
29	2,010	5,000	13,000	3,910	1,590	6,580	1,130	1,400	1,220	890	1,050	2,460
30	12,000	....	12,000	3,490	1,790	2,930	1,090	970	1,360	890	1,180	2,460
31	13,500	....	7,140	....	2,010	....	970	890	....	890	....	2,230

a Average daily discharge, Mar. 15-19, estimated at 16,000 second-feet. (Determined from observer's notes and by comparison with other Flint River stations.)

b Average daily discharge, Apr. 21-24, estimated at 14,000 second-feet. (Determined from observer's notes and by comparison with other Flint River stations.)

NOTE.—Daily discharge computed from a rating curve fairly well defined below 2,700 second-feet. Above 6,000 second-feet the estimates are only approximate.

Monthly discharge of Flint River near Culloden, Ga., for 1912.

[Drainage area, 2,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	13,500	1,490	4,040	2.02	2.33	C.
February	12,000	1,790	5,340	2.67	2.88	D.
March	....	2,960	7,770	3.88	4.47	D.
April	....	2,010	5,890	2.94	3.28	D.
May	8,320	1,220	3,070	1.54	1.78	C.
June	7,720	930	3,470	1.74	1.94	C.
July	5,680	970	2,460	1.23	1.42	C.
August	6,400	810	2,140	1.07	1.23	C.
September	2,700	735	1,200	.600	.67	B.
October	2,700	890	1,450	.725	.84	B.
November	1,590	810	1,030	.515	.57	A.
December	6,220	970	1,820	.910	1.05	C.
The year	....	735	3,300	1.65	22.46	

FLINT RIVER NEAR MONTEZUMA, GA.

Location.—At the iron highway bridge about 1 mile west of Montezuma. This is the second or upper wagon bridge. It is above the mouth of Bucks Creek.

Records available.—October 1, 1904, to December 31, 1912.

Drainage area.—2,700 square miles.

Gage.—Chain gage attached to the upstream side of the bridge; datum unchanged.

Channel.—The right bank will overflow for a great distance at a stage of about 12 feet. The overflowed portion is largely covered with a dense growth of brush. The left bank is not liable to overflow. The current toward the left bank becomes sluggish at low stages, and at times there is considerable back current near the bank. The bottom is somewhat shifting.

Discharge measurements.—Made from the downstream side of the highway bridge.

Artificial control.—The flow is not appreciably affected by artificial control.

Accuracy.—A fairly good rating has been developed, but the gage heights are very uncertain and the data should be used with caution.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

The following discharge measurement was made by W. E. Hall:

April 27, 1912, gage height, 13.84 feet; discharge, 10,500 second-feet.

Daily gage height, in feet, of Flint River near Montezuma, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.0	10.8	12.6	12.7	14.0	5.7	10.6	3.8	3.6	4.9	3.4	3.9
2	9.2	12.6	11.6	13.0	13.3	5.5	9.2	3.7	3.2	5.0	3.4	3.9
3	10.7	13.3	9.9	12.4	11.0	5.0	6.8	3.7	3.1	5.5	3.4	3.8
4	11.2	12.9	8.7	11.3	11.8	5.4	6.8	3.7	3.0	4.9	3.3	3.8
5	10.6	11.8	9.1	10.0	12.0	6.5	6.8	4.7	2.9	4.3	3.3	3.8
6	10.2	9.6	10.7	8.8	11.8	7.6	6.5	4.1	2.9	4.4	3.3	4.0
7	9.2	7.3	11.5	7.8	12.0	8.6	6.4	4.1	4.7	4.8	4.5	4.5
8	8.1	6.3	12.4	7.3	12.2	11.4	6.1	3.9	4.8	5.4	5.4	5.2
9	9.1	6.0	13.1	7.1	12.3	12.4	5.8	5.9	4.0	5.9	5.8	5.2
10	10.4	5.8	12.6	7.0	12.0	13.2	5.8	8.2	3.4	5.2	5.7	5.0
11	11.7	5.6	11.8	7.0	12.5	12.1	6.2	9.7	3.4	4.6	5.1	4.7
12	12.7	5.7	11.6	7.1	9.8	9.8	7.3	10.1	3.7	3.9	4.4	4.4
13	12.6	6.0	11.3	7.2	9.3	7.4	7.9	9.9	3.8	3.6	4.0	4.3
14	11.5	5.9	11.3	7.0	8.4	6.4	8.6	9.4	3.9	3.8	3.8	4.1
15	10.1	6.8	12.3	6.8	7.5	5.9	8.9	7.3	3.7	4.6	3.7	4.0
16	8.6	8.3	12.9	6.6	6.9	7.0	9.0	5.6	3.7	5.1	3.7	3.8
17	7.6	9.6	18.1	7.5	6.5	8.4	8.6	5.1	3.7	4.7	3.5	3.8
18	6.8	10.4	20.6	10.0	6.0	9.6	8.1	4.9	3.5	4.4	3.6	3.8
19	6.3	10.7	19.4	11.7	5.7	10.4	8.9	4.9	3.3	4.0	3.5	4.3
20	6.4	10.7	17.9	13.5	6.3	9.8	9.5	5.6	3.3	5.1	3.5	4.1
21	7.1	10.4	16.0	15.0	6.0	7.1	9.8	6.2	3.4	6.6	3.5	4.0
22	7.3	10.2	13.9	15.9	5.3	5.5	9.4	6.2	3.3	6.3	3.5	4.0
23	6.9	10.5	12.1	17.4	5.7	5.0	7.7	5.4	3.4	5.5	3.5	3.9
24	6.4	11.8	10.4	17.1	5.2	4.7	6.5	4.8	4.9	5.0	3.5	5.8
25	5.8	12.8	9.6	17.2	6.0	4.6	5.4	4.6	7.4	4.5	3.5	8.4
26	5.6	12.9	10.7	15.9	6.2	6.7	5.1	5.3	7.7	4.1	3.5	9.6
27	5.4	13.3	12.3	14.2	5.2	8.6	4.9	5.2	6.5	3.9	3.4	10.3
28	5.2	13.7	12.5	12.9	5.5	9.7	4.8	4.7	4.9	3.7	3.5	9.6
29	5.2	13.3	11.8	11.7	6.0	10.4	4.5	4.3	4.3	3.5	3.7	8.5
30	6.3	....	10.9	10.2	6.3	10.6	4.3	4.3	4.2	3.5	3.9	7.8
31	8.8	....	11.2	....	6.7	....	4.0	3.7	....	3.4	....	6.9

Daily discharge, in second-feet, of Flint River near Montezuma, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,000	7,460	9,250	9,350	10,600	3,270	7,270	2,090	1,980	2,740	1,880	2,140
2	6,000	9,250	8,250	9,650	9,950	3,140	6,000	2,040	1,780	2,810	1,880	2,140
3	7,360	9,950	6,610	9,050	7,650	2,810	4,060	2,040	1,730	3,140	1,880	2,090
4	7,850	9,550	5,570	7,950	8,450	3,070	4,060	2,040	1,680	2,740	1,830	2,090
5	7,270	8,450	5,910	6,700	8,650	3,840	4,060	2,620	1,630	2,380	1,830	2,090
6	6,890	6,340	7,360	5,660	8,450	4,680	3,840	2,260	1,630	2,440	1,830	2,200
7	6,000	4,440	8,150	4,840	8,650	5,480	3,760	2,260	2,620	2,680	2,500	2,500
8	5,080	3,690	9,050	4,440	8,850	8,050	3,550	2,140	2,680	3,070	3,070	2,940
9	5,910	3,480	9,750	4,280	8,950	9,050	3,340	3,410	2,200	3,410	3,340	2,940
10	7,080	3,340	9,250	4,210	8,650	9,850	3,340	5,160	1,880	2,940	3,270	2,810
11	8,350	3,200	8,450	4,210	9,150	8,750	3,620	6,430	1,880	2,560	2,880	2,620
12	9,350	3,270	8,250	4,280	6,520	6,520	4,440	6,800	2,040	2,140	2,440	2,440
13	9,250	3,480	7,950	4,360	6,080	4,520	4,920	6,610	2,090	1,980	2,200	2,380
14	8,150	3,410	7,950	4,210	5,320	3,760	5,480	6,160	2,140	2,090	2,090	2,200
15	6,800	4,060	8,950	4,000	4,600	3,410	5,740	4,440	2,040	2,560	2,040	2,200
16	5,480	5,240	9,550	3,910	4,140	4,210	5,820	3,200	2,040	2,880	2,040	2,090
17	4,680	6,340	15,100	4,600	3,840	5,320	5,480	2,880	2,040	2,620	1,930	2,090
18	4,060	7,080	17,900	6,700	3,480	6,340	5,080	2,740	1,930	2,440	1,980	2,090
19	3,690	7,360	16,500	8,350	3,270	7,080	5,740	2,740	1,830	2,200	1,930	2,380
20	3,760	7,360	14,900	10,200	3,690	6,520	6,250	3,200	1,830	2,880	1,930	2,260
21	4,280	7,080	12,800	11,700	3,480	4,280	6,520	3,620	1,880	3,910	1,930	2,200
22	4,440	6,890	10,600	12,700	3,000	3,140	6,160	3,620	1,830	3,690	1,930	2,200
23	4,140	7,180	8,750	14,300	3,270	2,810	4,760	3,070	1,880	3,140	1,930	2,140
24	3,760	8,450	7,080	14,000	2,940	2,620	3,840	2,680	2,740	2,810	1,930	3,340
25	3,340	9,450	6,340	14,100	3,480	2,560	3,070	2,560	4,520	2,500	1,930	5,320
26	3,200	9,550	7,360	12,700	3,620	3,980	2,880	3,000	4,760	2,260	1,980	6,340
27	3,070	9,950	8,950	10,800	2,940	5,480	2,740	2,940	3,840	2,140	1,880	6,980
28	2,940	10,400	9,150	9,550	3,140	6,430	2,680	2,620	2,740	2,040	1,930	6,340
29	2,940	9,950	8,450	8,350	3,480	7,080	2,500	2,380	2,380	1,930	2,040	5,400
30	3,690	....	7,560	6,890	3,690	7,270	2,380	2,380	2,320	1,930	2,140	4,840
31	5,660	....	7,850	....	3,980	....	2,200	2,040	....	1,880	....	4,140

NOTE.—Daily discharge computed from a rating curve fairly well defined above 1,000 second-feet.

Monthly discharge of Flint River near Montezuma, Ga., for 1912.

[Drainage area, 2,700 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	9,350	2,940	5,470	2.03	2.34	B.
February	10,400	3,200	6,750	2.50	2.70	B.
March	17,900	5,570	9,340	3.46	3.99	C.
April	14,300	3,910	7,870	2.91	3.25	C.
May	10,600	2,940	5,680	2.10	2.42	B.
June	9,850	2,560	5,180	1.92	2.14	B.
July	7,270	2,200	4,370	1.62	1.87	B.
August	6,800	2,040	3,300	1.22	1.41	B.
September	4,760	1,630	2,290	.848	.95	B.
October	3,910	1,880	2,610	.967	1.11	B.
November	3,340	1,830	2,140	.793	.88	B.
December	6,980	2,090	3,100	1.15	1.33	B.
The year	17,900	1,630	4,840	1.79	24.39	

FLINT RIVER AT ALBANY, GA.

Location.—At the Dougherty County highway bridge in the city of Albany, 700 feet below the Atlantic Coast Line Railroad bridge.

Records available.—April 10, 1893, to December 31, 1912. (United States Weather Bureau gage heights.) Discharge measurements were begun by the Geological Survey in 1901, and estimates of daily discharge have been made from January 1, 1902, to December 31, 1912.

Drainage area.—5,000 square miles.

Gage.—Standard chain gage installed at the bridge by the United States Geological Survey April 20, 1904. The original staff gage was washed out in 1898. It was again injured in 1902, and on June 18, 1902, a new gage was installed by the United States Weather Bureau at a datum 0.75 foot lower than that of the former gage. The 1902 gage heights, as published by the United States Weather Bureau and the United States Geological Survey, all refer to the new gage datum. The present standard chain gage has the same datum as and reads in conformity with the United States Weather Bureau gage.

Channel.—The channel at and below the gage may shift slightly but the control is such that conditions of flow are practically permanent. The river overflows both banks but only under the approaches to the bridge.

Discharge measurements.—Fairly accurate measurements can be made at the section at the Atlantic Coast Line bridge, although it is very rough, and train switching in the railroad yard interferes with the work. The section at the Georgia Northern Railway bridge, 1 mile above, at which measurements are sometimes made, is considered better, especially for medium and low stages.

Artificial control.—Power developments on Muckalee Creek, which joins Flint River about 2 miles above the station, cause considerable diurnal fluctuation, especially at low stages. It is probable that the flow is also affected by other power plants farther up the river.

Accuracy.—As the records are based on one gage reading a day, made at 7 a. m., it is probable that the estimates of daily discharge are somewhat in error, especially at low stages. The actual daily discharge is probably greater than that indicated by the 7 a. m. reading.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Discharge measurements of Flint River at Albany, Ga., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 26	W. E. Hall	27.30	46,100
Nov. 12	.....do	6.89	9,390

Daily gage height, in feet, of Flint River at Albany, Ga., for 1912.

[D. W. Brosnan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13.6	9.9	16.5	13.8	17.7	4.2	7.1	2.2	2.8	4.2	2.6	3.5
2	12.1	10.0	15.7	13.3	14.4	4.5	7.2	2.3	2.4	4.5	2.8	3.7
3	11.1	10.3	14.0	13.0	10.4	4.2	7.4	2.0	2.1	5.1	2.8	3.5
4	10.7	11.4	13.3	13.0	9.9	4.0	6.8	2.8	1.9	5.5	2.6	3.2
5	11.4	12.1	11.5	12.9	9.4	3.6	5.4	4.1	1.5	4.5	2.5	3.7
6	11.9	12.5	10.8	10.9	9.4	3.4	5.6	4.6	1.4	3.4	2.5	4.1
7	11.5	12.1	12.3	9.8	9.2	4.6	5.3	4.4	1.4	3.0	3.6	4.3
8	11.7	9.7	13.9	9.3	10.9	7.3	4.8	3.7	1.8	3.0	8.5	4.8
9	17.8	7.4	14.2	7.1	11.9	9.5	4.4	3.8	2.4	3.2	11.9	4.9
10	22.9	6.0	14.5	6.4	13.2	10.6	4.2	4.4	2.6	3.7	11.6	4.9
11	24.4	5.6	14.3	6.4	13.3	11.2	4.2	5.8	2.3	3.4	9.0	4.8
12	22.4	5.6	14.9	6.1	12.1	10.9	4.4	7.4	1.8	3.0	7.4	4.3
13	19.9	5.3	15.7	6.3	10.3	10.1	5.1	8.7	2.6	3.2	6.0	4.0
14	18.1	5.6	16.3	6.3	9.4	10.3	5.4	8.5	2.9	4.4	5.1	3.7
15	17.2	6.9	16.2	6.5	8.4	8.8	5.8	8.1	2.8	4.4	4.4	3.4
16	16.3	7.8	19.9	6.1	7.6	6.5	6.4	7.2	2.7	5.7	4.2	3.3
17	14.5	8.8	22.5	6.1	6.4	5.6	7.3	5.4	2.6	8.1	3.5	3.3
18	12.1	9.1	22.2	7.6	5.9	6.0	8.5	4.5	2.4	7.5	2.9	3.3
19	9.9	9.4	21.6	10.8	5.5	6.3	9.2	3.8	2.3	6.4	2.7	3.3
20	8.9	9.7	23.5	13.0	5.2	6.6	9.2	3.8	2.6	5.8	2.7	3.2
21	8.4	10.0	25.7	18.7	4.9	7.0	8.7	4.2	2.8	5.8	3.3	3.6
22	8.2	11.9	26.2	24.2	4.5	6.6	8.0	4.7	2.9	6.4	3.2	3.6
23	7.3	13.5	25.2	29.6	4.1	4.6	7.5	5.2	2.3	6.6	3.0	3.6
24	7.2	13.7	23.0	30.1	4.0	3.5	6.6	5.4	2.8	6.1	3.0	4.4
25	7.1	14.2	21.3	29.1	3.7	3.3	5.4	4.8	4.2	5.8	3.2	6.2
26	6.4	15.5	18.2	27.6	3.5	3.2	4.2	4.1	5.6	4.7	3.0	7.3
27	6.2	16.6	15.3	26.3	3.5	3.9	3.5	3.4	6.2	3.4	2.8	8.6
28	5.6	16.8	12.9	24.5	3.2	4.8	2.9	3.8	5.9	3.0	2.8	9.6
29	5.3	16.6	12.6	23.0	3.2	6.1	2.5	4.2	4.9	2.9	2.7	9.9
30	6.5	....	13.2	20.7	3.6	6.9	2.5	3.9	4.3	2.8	3.0	9.5
31	9.7	....	13.5	....	4.0	....	2.4	3.4	....	2.6	....	8.3

Daily discharge, in second-feet, of Flint River at Albany, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	18,000	13,000	22,600	18,300	24,700	6,020	9,540	3,770	4,410	6,020	4,190	5,210
2	15,900	13,200	21,300	17,600	19,200	6,360	9,670	3,870	3,980	6,360	4,410	5,440
3	14,600	13,500	18,600	17,200	13,700	6,020	9,920	3,570	3,670	7,060	4,410	5,210
4	14,000	14,900	17,600	17,200	13,000	5,780	9,170	4,410	3,480	7,540	4,190	4,860
5	14,900	15,900	15,100	17,000	12,400	5,320	7,420	5,900	3,110	6,360	4,080	5,440
6	15,600	16,400	14,200	14,300	12,400	5,100	7,670	6,480	3,020	5,100	4,080	5,900
7	15,100	15,900	16,200	12,900	12,200	6,480	7,300	6,240	3,020	4,640	5,320	6,130
8	15,300	12,800	18,500	12,300	14,300	9,800	6,700	5,440	3,380	4,640	11,300	6,700
9	24,900	9,920	18,900	9,540	15,600	12,500	6,240	5,560	3,980	4,860	15,600	6,820
10	35,500	8,170	19,400	8,670	17,400	13,900	6,020	6,240	4,190	5,440	15,200	6,820
11	39,000	7,670	19,100	8,670	17,600	14,700	6,020	7,920	3,870	5,100	11,900	6,700
12	34,300	7,670	20,000	8,300	15,900	14,300	6,240	9,920	3,380	4,640	9,920	6,130
13	28,800	7,300	21,300	8,540	13,500	13,300	7,060	11,500	4,190	4,860	8,170	5,780
14	25,400	7,670	22,300	8,540	12,400	13,500	7,420	11,300	4,520	6,240	7,060	5,440
15	23,800	9,300	22,100	8,800	11,200	11,700	7,920	10,800	4,410	6,240	6,240	5,100
16	22,300	10,400	28,800	8,300	10,200	8,800	8,670	9,670	4,300	7,800	6,020	4,980
17	19,400	11,700	34,600	8,300	8,670	7,670	9,800	7,420	4,190	10,800	5,210	4,980
18	15,900	12,000	33,900	10,200	8,040	8,170	11,300	6,360	3,980	10,000	4,520	4,980
19	13,000	12,400	32,500	14,200	7,540	8,540	12,200	5,560	3,870	8,670	4,300	4,980
20	11,800	12,800	36,800	17,200	7,180	8,920	12,200	5,560	4,190	7,920	4,300	4,860
21	11,200	13,200	42,100	26,500	6,820	9,420	11,500	6,020	4,410	7,920	4,980	5,320
22	10,900	15,600	43,300	38,500	6,360	8,920	10,700	6,590	4,520	8,670	4,860	5,230
23	9,800	17,900	40,900	51,900	5,900	6,480	10,000	7,180	3,870	8,920	4,640	5,320
24	9,670	18,200	35,700	53,200	5,780	5,210	8,920	7,420	4,410	8,300	4,640	6,240
25	9,540	18,900	31,900	50,600	5,440	4,980	7,420	6,700	6,020	7,920	4,860	8,420
26	8,670	21,000	25,600	46,700	5,210	4,860	6,020	5,900	7,670	6,590	4,640	9,800
27	8,420	22,800	20,600	43,500	5,210	5,670	5,210	5,100	8,420	5,100	4,410	11,400
28	7,670	23,200	17,000	39,200	4,860	6,700	4,520	5,560	8,040	4,640	4,410	12,700
29	7,300	22,800	16,600	35,700	4,860	8,300	4,080	6,020	6,820	4,520	4,300	13,000
30	8,800	....	17,400	30,500	5,320	9,300	4,080	5,670	6,130	4,410	4,640	12,500
31	12,800	....	17,900	....	5,780	....	3,980	5,100	....	4,190	....	11,000

NOTE.—Daily discharge computed from a rating curve well defined between 2,000 and 24,000 second-feet and fairly well defined below 48,000 second-feet.

Monthly discharge of Flint River at Albany, Ga., for 1912.

[Drainage area, 5,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	39,000	7,300	16,800	3.36	3.87	B.
February	23,200	7,300	14,000	2.80	3.02	A.
March	43,300	14,200	24,600	4.92	5.67	B.
April	53,200	8,300	22,100	4.42	4.93	B.
May	24,700	4,860	10,600	2.12	2.44	A.
June	14,700	4,860	8,560	1.71	1.91	A.
July	12,200	3,980	7,900	1.58	1.82	A.
August	11,500	3,570	6,600	1.32	1.52	A.
September	8,420	3,020	4,580	.916	1.02	A.
October	10,800	4,190	6,500	1.30	1.50	A.
November	15,600	4,080	6,230	1.25	1.40	A.
December	13,000	4,860	6,890	1.38	1.59	A.
The year	53,200	3,020	11,300	2.26	30.69	

FLINT RIVER AT BAINBRIDGE, GA.

Location.—At the county wagon bridge half a mile from Bainbridge and about 25 miles above the confluence of Flint and Chattahoochee rivers.

Records available.—October 7, 1904, to December 8, 1912. (Weather Bureau gage-height readings.) Discharge measurements were begun by the Geological Survey June 11, 1908, and estimates of daily discharge have been made from January 1, 1908, to December 31, 1912.

Drainage area.—7,410 square miles. (United States Weather Bureau.)

Gage.—Standard chain gage attached to the highway bridge. The datum has not been changed since June 11, 1908, at which time it was adjusted to its original datum. During part of the time prior to this date the chain was wrongly adjusted. Gage heights for 1908 were all corrected before publication in Water-Supply Paper 242.

Channel.—Bed is soft and likely to shift, but appears to have remained fairly permanent, as indicated by constancy of discharge ratings.

Accuracy.—It is possible that daily discharge as determined by one gage-height reading a day may be somewhat in error for individual days, otherwise the accuracy is good for low and medium stages.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

The following discharge measurement was made by W. E. Hall:

November 13, 1912, gage height, 11.57 feet; discharge, 14,000 second-feet.

Daily gage height, in feet, of Flint River at Bainbridge, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.3	11.8	20.0	18.8	27.1	9.8	11.4	8.0	8.2	10.1	7.1	7.7
2	18.0	12.9	20.0	18.8	25.1	9.7	12.0	7.8	7.9	9.6	7.0	7.7
3	16.5	13.5	19.2	18.7	22.7	10.0	12.1	7.4	7.5	9.3	6.9	7.8
4	16.1	14.1	18.8	18.4	20.1	9.9	12.2	8.4	7.2	9.0	6.8	7.9
5	15.7	14.7	18.3	18.3	18.2	9.5	11.7	8.1	6.9	9.0	6.7	7.8
6	15.3	15.1	16.2	17.8	17.6	9.7	11.1	9.1	6.6	8.9	6.9	7.7
7	15.4	14.9	16.3	17.4	17.4	10.0	11.1	9.6	6.5	8.6	7.0	7.6
8	15.5	14.7	16.3	16.0	17.6	10.9	10.6	10.1	6.3	8.5	9.1	7.5
9	16.1	14.5	17.0	14.7	18.0	11.9	10.2	9.7	6.4	7.1	10.2	7.4
10	19.0	13.6	17.4	13.4	18.3	12.5	10.0	9.5	6.5	7.6	12.8	7.2

Daily gage height, in feet, of Flint River at Bainbridge, Ga., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	22.5	12.7	18.1	13.0	18.9	12.9	9.8	10.2	6.7	7.5	13.9	7.3
12	25.0	11.4	18.2	12.7	19.0	13.7	10.0	10.9	6.9	7.5	13.6	7.2
13	26.0	10.3	18.5	12.6	18.4	14.8	10.0	11.7	7.2	7.5	12.2	7.3
14	25.0	10.8	18.9	12.6	17.3	14.9	10.0	12.2	7.3	7.7	10.0	7.3
15	24.5	11.0	19.7	12.6	16.1	13.7	10.8	12.3	7.3	7.9	10.1	7.2
16	24.1	11.2	20.5	12.5	15.3	12.5	11.2	11.9	7.6	8.2	9.4	7.4
17	23.5	12.1	23.0	12.3	14.1	11.3	11.8	11.4	7.4	8.8	8.9	7.6
18	21.0	12.9	24.0	12.4	13.4	11.2	12.2	10.5	7.2	9.7	8.4	7.8
19	18.6	13.7	25.2	13.5	13.0	11.3	12.7	9.5	7.0	11.2	8.2	7.9
20	16.5	13.5	25.5	15.3	12.5	11.4	13.0	9.2	6.8	10.6	8.1	7.7
21	15.9	13.9	25.3	18.1	12.1	11.5	13.8	9.0	7.0	10.4	8.0	7.6
22	14.7	14.6	25.7	20.8	12.0	11.6	13.3	9.1	7.1	10.4	8.0	7.5
23	13.3	15.8	26.3	23.9	11.2	11.2	12.9	9.5	7.2	10.3	8.0	7.3
24	13.4	16.4	27.0	27.0	11.2	10.1	12.1	9.6	7.4	10.2	8.2	7.1
25	13.4	17.2	26.4	31.8	11.1	9.5	11.5	9.7	8.1	10.0	8.4	6.9
26	13.2	18.2	25.3	33.5	10.3	9.9	10.6	9.9	8.5	9.4	8.4	6.7
27	12.6	19.1	24.0	33.4	10.0	10.1	9.4	9.6	8.9	8.9	8.3	6.6
28	11.8	19.9	22.0	32.5	9.9	10.5	8.9	9.5	9.6	8.6	8.3	8.1
29	11.5	20.2	20.2	30.9	9.5	10.6	8.6	9.3	10.2	8.1	8.2	10.6
30	11.4		19.3	29.9	9.4	10.8	8.2	9.3	10.8	7.4	7.8	12.8
31	11.3		19.0		9.6		8.0	8.8		7.2		12.2

Daily discharge, in second-feet, of Flint River at Bainbridge, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		14,300				10,400	13,500	7,830	8,070	11,000	6,860	7,480
2						10,300	14,700	7,590	7,710	10,100	6,770	7,480
3						10,800	15,000	7,160	7,260	9,620	6,680	7,590
4						10,600	15,200	8,330	6,960	9,160	6,590	7,710
5						9,940	14,100	7,950	6,680	9,160	6,500	7,590
6						10,300	12,900	9,310	6,410	9,020	6,680	7,480
7						10,800	12,900	10,100	6,320	8,600	6,770	7,370
8						12,500	11,900	11,000	6,140	8,460	9,310	7,260
9						14,500	11,200	10,300	6,230	6,860	11,200	7,160
10						15,800	10,800	9,940	6,320	7,370		6,960
11							10,400	11,200	6,500	7,260		7,060
12		13,500					10,800	12,500	6,680	7,260		6,960
13		11,300					10,800	14,100	6,960	7,260	15,200	7,060
14		12,300					10,800	15,200	7,060	7,480	10,800	7,060
15		12,700					12,300	15,400	7,060	7,710	11,000	6,960
16		13,100		15,800		15,800	13,100	14,500	7,370	8,070	9,780	7,160
17		15,000		15,400		13,300	14,300	13,500	7,160	8,880	9,020	7,370
18				15,600		13,100	15,200	11,700	6,960	10,300	8,330	7,590
19						13,300		9,940	6,770	13,100	8,070	7,710
20					15,800	13,500		9,460	6,590	11,900	7,950	7,480
21					15,000	13,700		9,160	6,770	11,500	7,830	7,370
22					14,700	13,900		9,310	6,860	11,500	7,830	7,260
23					13,100	13,100		9,940	6,960	11,300	7,830	7,060
24					13,100	11,000	15,000	10,100	7,160	11,200	8,070	6,860
25					12,900	9,940	13,700	10,300	7,950	10,800	8,330	6,680
26					11,300	10,600	11,900	10,600	8,460	9,780	8,330	6,500
27					10,800	11,000	9,780	10,100	9,020	9,020	8,200	6,410
28	14,300				10,600	11,700	9,020	9,940	10,100	8,600	8,200	7,950
29	13,700				9,940	11,900	8,600	9,620	11,200	7,950	8,070	11,900
30	13,500				9,780	12,300	8,070	9,620	12,300	7,160	7,590	
31	13,300				10,100		7,830	8,880		6,960		15,200

NOTE.—Daily discharge computed from a rating curve fairly well defined between 3,000 and 15,000 second-feet. The discharge exceeded 16,000 second-feet on days for which estimates are not given.

CHIPOLA RIVER NEAR ALTHA, FLA.

Location.—About 3½ miles west of Altha, Fla., 3 miles above the mouth of Tenmile Creek and 1 mile above Luck and Tremble Shoals at head of navigation.

Records available.—November 21 to December 31, 1912.

Drainage area.—740 square miles.

Gage.—Vertical staff gage spiked to cedar stump on left bank; gage is temporary and is to be replaced by a permanent gage at same place.

Channel.—Rough, with bottom of soft limestone; both banks are steep and rarely overflow.

Discharge measurements.—From low stages up to gage height about 12 feet, measurements can be made from downstream side of single span steel highway bridge known as Willis Bridge.

Artificial control.—None.

Accuracy.—Conditions favor a high degree of accuracy for all stages that can be covered by discharge measurement.

The following discharge measurement was made by W. E. Hall:

November 22, 1912, gage height, 10.49 feet; discharge, 1,480 second-feet.

Daily gage height, in feet, of Chipola River near Altha, Fla., for 1912.

[D. L. Carroll, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	....	10.0	11	....	10.25	21	10.6	10.1
2	....	9.95	12	....	10.2	22	10.45	10.2
3	....	10.0	13	....	10.1	23	10.3	10.25
4	....	10.0	14	....	10.15	24	10.2	10.25
5	....	10.05	15	....	10.2	25	10.1	10.2
6	....	10.05	16	....	10.25	26	10.0	10.1
7	....	10.0	17	....	10.2	27	10.0	10.2
8	....	10.1	18	....	10.15	28	10.25	10.45
9	....	10.35	19	....	10.2	29	10.2	10.4
10	....	10.15	20	....	10.15	30	10.1	11.05
						31	....	11.25

CHOCTAWHATCHEE RIVER BASIN.

CHOCTAWHATCHEE RIVER NEAR NEWTON, ALA.

Location.—At the wagon bridge 1 mile west of Newton, Ala., and 1 mile below the railroad crossing at Elba Junction, Ala., about 5 miles below the mouth of West Choctawhatchee River.

Records available.—June 11 to October 13, 1906; April 22, 1907, to August 22, 1908; October 20, 1911, to August 3, 1912.

Drainage area.—Not determined.

Gage.—Standard chain gage attached to the downstream side of the wagon bridge; datum unchanged. The gage heights during 1906 were taken from a vertical gage near Elba Junction, but they were reduced to agree with the chain gage.

Channel.—Both banks are high and not likely to overflow. Conditions of flow may possibly be affected by dredging of channel.

Discharge measurements.—Made from the wagon bridge.

Artificial control.—Probably some effect from small power plant above.

Accuracy.—No rating was developed for the changed conditions of section in 1911-12. No discharge measurements were made at this station during 1912.

Daily gage height, in feet, of Choctawhatchee River near Newton, Ala., for 1912.

[J. M. Hodge, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.0	5.0	6.0	5.8	5.2	5.4	2.6	3.3	......	......	......	......
2	10.0	5.0	5.8	5.7	5.2	5.9	3.7	3.2	......	......	......	......
3	9.0	4.0	4.8	5.1	5.1	5.7	3.8	4.0	......	......	......	......
4	8.5	3.9	4.6	5.2	5.0	5.5	3.9	......	......	......	......	......
5	7.0	3.8	4.5	5.4	5.0	4.4	4.4	......	......	......	......	......
6	7.0	3.6	6.6	5.6	4.8	4.3	4.6	......	......	......	......	......
7	12.0	3.4	6.1	5.6	4.6	4.0	4.6	......	......	......	......	......
8	19.1	3.2	6.0	5.8	4.5	4.6	4.5	......	......	......	......	......
9	20.0	5.0	5.4	5.9	5.0	4.8	4.4	......	......	......	......	......
10	16.0	6.0	5.0	6.0	5.0	5.2	4.4	......	......	......	......	......
11	10.0	6.3	8.0	6.2	4.8	5.3	4.6	......	......	......	......	......
12	8.0	6.5	10.0	6.9	4.4	5.0	4.6	......	......	......	......	......
13	7.6	6.6	13.6	11.0	4.2	4.9	4.7	......	......	......	......	......
14	7.0	7.6	16.0	13.0	3.6	4.7	4.8	......	......	......	......	......
15	6.5	5.6	16.0	21.6	3.4	4.4	4.5	......	......	......	......	......
16	5.6	5.0	15.5	21.6	3.3	4.0	3.9	......	......	......	......	......
17	5.4	5.0	10.4	15.6	3.0	3.9	3.4	......	......	......	......	......
18	5.0	4.8	8.0	10.0	3.4	3.4	4.0	......	......	......	......	......
19	4.8	4.6	6.8	8.0	4.0	3.3	3.8	......	......	......	......	......
20	4.7	4.5	5.8	6.0	4.3	3.2	3.6	......	......	......	......	......
21	4.2	5.7	5.4	5.8	5.2	3.1	3.4	......	......	......	......	......
22	4.0	6.5	5.2	5.6	6.0	3.1	3.2	......	......	......	......	......
23	3.7	7.0	5.8	5.3	6.2	3.0	3.2	......	......	......	......	......
24	3.6	8.0	5.8	5.0	5.4	3.0	3.1	......	......	......	......	......
25	3.4	8.6	6.0	5.4	5.0	2.9	3.1	......	......	......	......	......
26	3.3	9.0	5.4	5.6	5.0	2.8	3.2	......	......	......	......	......
27	3.4	10.0	5.2	5.8	5.8	2.7	3.2	......	......	......	......	......
28	3.6	9.0	5.2	6.0	5.4	2.7	3.1	......	......	......	......	......
29	4.0	9.0	5.0	6.2	5.4	2.5	3.0	......	......	......	......	......
30	6.9	......	5.4	5.8	5.5	2.5	3.0	......	......	......	......	......
31	6.0	......	5.6	......	5.3	......	3.2	......	......	......	......	......

PEA RIVER AT PERA, ALA.

Location.—At the Elton wagon bridge half a mile west of Pera, Ala., about 10 miles above the mouth of Flat Creek; no tributary streams except very small ones come in nearer the station.

Records available.—August 27, 1904, to December 31, 1912.

Drainage area.—1,180 square miles.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—In soft rock; nearly permanent.

Discharge measurements.—Made from the downstream side of the wagon bridge to which the gage is attached.

Artificial control.—Power plants on Whitewater Creek, a tributary stream above the station, cause diurnal fluctuations in the low-water flow. The gage is read twice a day to lessen the effect of such fluctuations.

Accuracy.—The estimates of daily discharge may be considerably in error for individual days due to the operation of the power plants above the station. No discharge measurements were made at this station during 1912.

Daily gage height, in feet, of Pea River at Pera, Ala., for 1912.

[W. G. Early, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	20.0	15.0	14.4	12.0	12.8	4.8	5.2	3.4	4.0	8.7	5.8	6.6
2	15.9	15.2	12.2	11.2	13.8	5.4	5.8	4.6	3.7	9.0	5.6	6.6
3	14.6	16.4	10.7	11.2	14.0	10.6	5.8	5.7	3.6	7.8	5.7	6.4
4	16.1	13.8	10.4	10.6	13.8	7.1	6.7	6.1	3.4	7.4	5.4	6.8
5	14.2	10.4	14.4	9.5	12.4	6.2	7.2	7.0	3.4	7.2	5.2	14.5
6	12.0	9.3	13.6	8.8	11.8	5.6	6.6	5.9	3.5	6.0	6.0	13.9
7	12.2	8.6	12.2	8.4	12.4	7.2	6.0	5.2	3.4	5.6	19.2	12.0
8	16.2	8.0	11.1	8.0	13.4	9.3	5.6	5.6	3.3	5.2	23.6	11.7
9	24.0	7.8	10.8	7.8	11.4	8.2	6.4	5.8	3.0	4.8	21.6	10.3
10	22.7	7.6	12.2	7.6	10.2	7.2	6.6	6.4	3.2	4.6	16.8	9.3
11	21.0	10.0	11.8	9.7	9.8	7.6	6.2	7.6	3.4	4.4	14.3	8.8
12	17.3	8.5	15.0	10.2	9.5	6.8	6.0	6.8	3.5	4.2	13.2	8.4
13	15.3	7.2	17.3	10.3	8.6	6.1	5.8	6.0	3.4	4.1	11.0	8.4
14	14.0	9.1	15.6	11.4	8.2	6.0	6.1	5.6	4.3	5.8	10.2	8.0
15	12.0	12.4	22.0	10.2	8.0	6.0	5.7	5.2	7.5	10.9	9.4	8.0
16	10.8	11.1	27.4	9.2	7.7	5.7	5.4	5.0	7.4	10.0	8.4	7.6
17	9.8	11.0	28.1	12.2	7.4	5.6	5.0	5.0	7.2	8.4	8.0	7.2
18	9.1	12.0	28.8	19.6	7.2	5.6	4.5	5.5	5.4	9.2	7.4	7.0
19	9.0	10.7	29.4	18.8	6.7	5.4	4.7	5.7	5.3	14.2	7.2	6.6
20	9.0	10.1	24.7	18.6	6.3	4.9	5.2	9.0	6.2	18.4	7.0	6.6
21	8.6	13.2	20.1	27.4	6.1	4.6	5.4	7.2	7.6	18.6	6.9	6.6
22	8.1	19.0	15.0	30.1	6.0	4.4	5.2	6.2	7.0	15.4	6.7	6.4
23	7.8	17.8	12.2	31.4	5.8	4.4	4.8	7.2	7.8	12.2	6.8	7.0
24	7.6	16.4	12.6	32.8	5.7	4.1	4.4	8.5	9.7	10.6	6.6	15.5
25	7.6	19.0	15.8	32.1	5.6	4.2	4.2	6.2	8.9	9.6	6.4	17.6
26	7.4	19.1	13.4	28.7	5.4	4.9	3.8	5.8	8.4	8.6	6.2	16.0
27	7.2	18.2	12.5	24.8	5.2	5.8	3.8	5.6	8.2	7.6	6.2	15.7
28	7.0	17.2	11.7	19.5	5.1	5.0	3.4	5.6	8.2	6.6	6.6	17.4
29	8.7	16.2	12.6	14.2	5.0	5.0	3.4	4.7	6.8	6.3	7.2	16.2
30	15.6	....	14.2	12.3	4.9	5.3	3.3	4.4	7.1	6.0	6.7	13.1
31	16.0	....	12.8	....	4.8	....	3.2	4.4	....	5.8	....	12.2

Daily discharge, in second-feet, of Pea River at Pera, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7,350	5,060	4,770	3,670	4,040	794	906	476	600	2,180	1,090	1,360
2	5,460	5,140	3,760	3,300	4,500	965	1,090	741	535	2,310	1,030	1,360
3	4,870	5,690	3.070	3,300	4,590	3,030	1,090	1,060	515	1,820	1,060	1,290
4	5,560	4,500	2,930	3,030	4,500	1,550	1,400	1.190	476	1,660	965	1,430
5	4,680	2,930	4,770	2,530	3,850	1,220	1,590	1,510	476	1,590	906	4,820
6	3,670	2,440	4,410	2,230	3,580	1,030	1,360	1,120	495	1,160	1,160	4,540
7	3,760	2,140	3,760	2,060	3,850	1,590	1,160	906	476	1,030	6,980	3,670
8	5,600	1,900	3,260	1,900	4,310	2,440	1,030	1,030	457	906	9,010	3,530
9	9,190	1,820	3,120	1,820	3,390	1,980	1,290	1,090	400	794	8,090	2,890
10	8,590	1,740	3,760	1,740	2,840	1,590	1,360	1,290	438	741	5,880	2,440
11	7,810	2,750	3,580	2,620	2,660	1,740	1,220	1,740	476	691	4,730	2,230
12	6,110	2,100	5,050	2,840	2,530	1,430	1,160	1,430	495	644	4,220	2,060
13	5,190	1,590	6,110	2,890	2,140	1,190	1,090	1,160	476	622	3,210	2,060
14	4,590	2,350	5,330	3,390	1,980	1,160	1,190	1,030	667	1,090	2,840	1,900
15	3,670	3,850	8,270	2,840	1,900	1,160	1,060	906	1,700	3,160	2,490	1,900
16	3,120	3,260	10,800	2,400	1,780	1,060	965	850	1,660	2,750	2,060	1,740
17	2,660	3,210	11,100	3,760	1,660	1,030	850	850	1,590	2,060	1,900	1,590
18	2,350	3,670	11,400	7,170	1,590	1,030	715	995	965	2,400	1,660	1,510
19	2,310	3,070	11,700	6,800	1,400	965	767	1,060	935	4,680	1,590	1,360
20	2,310	2,800	9,510	6,710	1,260	822	906	2,310	1,220	6,610	1,510	1,360
21	2,140	4,220	7,400	10,800	1,190	741	965	1,590	1,740	6,710	1,470	1,360
22	1,940	6,890	5,050	12,000	1,160	691	906	1,220	1,510	5,230	1,400	1,290
23	1,820	6,340	3,760	12,600	1,090	691	794	1,590	1,820	3,760	1,430	1,510
24	1,740	5,690	3,950	13,200	1,060	622	691	2,100	2,620	3,030	1,360	5,280
25	1,740	6,890	5,420	12,900	1,030	644	644	1,220	2,270	2,570	1,290	6,250

Daily discharge, in second-feet, of Pea River at Pera, Ala., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	1,660	6,940	4,310	11,400	965	822	556	1,090	2,060	2,140	1,220	5,510
27	1,590	6,520	3,900	9,560	906	1,090	556	1,030	1,980	1,740	1,220	5,370
28	1,510	6,060	3,530	7,120	878	850	476	1,030	1,980	1,360	1,360	6,150
29	2,180	5,600	3,950	4,680	850	850	476	767	1,430	1,260	1,590	5,600
30	5,330	....	4,680	3,810	822	935	457	691	1,550	1,160	1,400	4,180
31	5,510	....	4,040	....	794	....	438	691	....	1,090	....	3,760

NOTE.—Daily discharge computed from a well defined rating curve.

Monthly discharge of Pea River at Pera, Ala., for 1912.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	9,190	1,510	4,060	3.44	3.97
February	6,940	1,590	4,040	3.42	3.69
March	11,700	2,930	5,500	4.66	5.37
April	13,200	1,740	5,500	4.66	5.20
May	4,590	794	2,230	1.89	2.18
June	3,030	622	1,190	1.01	1.13
July	1,590	438	941	.797	.92
August	2,310	476	1,150	.975	1.12
September	2,620	400	1,130	.958	1.07
October	6,710	622	2,220	1.88	2.17
November	9,010	906	2,540	2.15	2.40
December	6,250	1,290	2,950	2.50	2.88
The year	13,200	400	2,780	2.36	32.10

ESCAMBIA RIVER BASIN.

CONECUH RIVER AT BECK, ALA.

Location.—At Simmons Bridge at Beck, about 12 miles below the mouth of Patsaliga Creek, 8 miles west of Andalusia, Ala., a station on the Central of Georgia and Louisville & Nashville railroads.

Records available.—August 24, 1904, to December 31, 1912.

Drainage area.—1,290 square miles.

Gage.—Standard chain gage attached to the upstream side of the wagon bridge; datum unchanged.

Channel.—In soft bed rock and practically permanent. Both banks are subject to overflow at high stages.

Discharge measurements.—Made from the wagon bridge. No discharge measurements were made at this station during 1912.

Artificial control.—The flow is probably not affected by artificial control, but at times may be affected by logging operations.

Accuracy.—Conditions of flow at this station are practically permanent and a good rating has been developed in previous years. Estimates for 1912 are based on 1911 rating.

Daily gage height, in feet, of Conecuh River at Beck, Ala., for 1912.

[J. F. Hicks, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	16.3	14.1	13.1	12.2	3.1	4.2	2.2	......	6.6	3.7	......
2	7.8	14.8	13.3	11.9	10.9	......	5.6	3.3	......	6.6	3.6	4.4
3	10.7	16.4	......	11.3	11.5	3.8	5.7	2.5	2.5	6.4	......	4.5
4	10.8	......	10.2	11.4	10.4	3.3	......	......	2.3	6.4	3.5	4.5
5	10.1	16.9	8.8	10.3	......	3.6	5.3	4.9	2.2	6.0	3.4	7.5
6	9.3	13.3	10.5	8.7	10.5	3.3	5.6	3.7	2.2	......	4.3	8.0
7	......	9.8	10.3	......	11.5	4.5	......	2.9	2.2	5.5	18.3	8.2
8	12.5	8.0	9.3	7.0	10.6	4.7	4.6	3.0	......	4.5	15.7	......
9	16.3	7.1	9.2	6.3	9.2	......	4.3	4.1	2.0	3.9	14.7	7.6
10	15.4	6.6	......	6.1	8.3	5.0	4.1	4.0	2.0	3.4	......	7.4
11	14.9	......	9.0	7.8	8.0	4.5	3.9	......	2.3	3.2	10.9	7.2
12	13.0	6.9	14.3	7.9	......	3.9	4.2	6.0	2.3	3.0	11.5	7.0
13	10.8	6.6	13.1	8.2	7.0	3.6	4.6	6.3	2.3	......	12.5	7.0
14	......	7.7	12.4	......	6.5	4.9	......	5.9	2.4	8.9	11.9	6.4
15	10.0	10.6	17.0	7.7	5.9	4.3	3.8	4.6	......	8.3	8.9	......
16	9.5	11.0	18.2	7.1	5.5	......	3.3	3.5	3.3	6.7	5.5	5.7
17	8.1	10.9	......	13.1	5.1	4.3	3.3	3.2	3.7	5.2	......	5.3
18	7.2	......	22.5	13.4	4.9	3.9	3.2	......	3.7	5.2	5.3	5.3
19	6.7	10.6	26.6	13.9	......	3.6	3.0	3.0	4.0	9.7	5.2	5.0
20	6.1	16.0	26.5	21.1	4.5	3.3	3.3	3.7	3.9	......	5.1	4.9
21	......	17.0	22.4	......	4.3	3.1	......	5.0	4.0	8.9	5.0	4.8
22	5.3	......	17.3	31.6	4.1	3.0	3.2	4.7	......	7.7	4.9	......
23	5.2	16.0	12.7	31.1	4.0	......	3.2	4.9	4.3	7.2	4.8	7.1
24	5.0	16.6	......	29.8	3.9	2.7	3.1	5.0	4.4	6.7	......	11.2
25	4.8	17.8	12.4	29.6	3.8	2.6	2.8	......	4.1	6.4	4.6	13.0
26	4.7	18.6	12.0	28.6	......	2.5	2.6	4.0	4.4	5.9	4.5	13.0
27	4.5	17.5	12.3	28.6	3.6	2.5	2.4	4.0	5.0	......	4.4	12.2
28	......	15.8	12.2	......	3.4	2.4	......	4.0	4.2	4.9	......	12.1
29	13.4	......	14.8	17.0	3.4	2.5	2.2	4.2	......	4.3	4.4	......
30	16.2	......	14.9	14.5	......	......	2.1	4.2	4.9	4.0	4.6	15.5
31	16.4	......	......	......	3.2	......	2.0	3.1	......	3.8	......	14.8

Daily discharge, in second-feet, of Conecuh River at Beck, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a]2,570	7,830	6,580	6,010	5,490	720	1,170	443	[a]655	2,370	955	[a]1,300
2	3,020	6,980	6,120	5,320	4,750	[a]858	1,830	795	[a]589	2,370	914	1,260
3	4,640	7,890	[a]5,240	4,980	5,100	996	1,890	524	524	2,270	[a]894	1,300
4	4,700	[a]8,030	4,360	5,040	4,470	795	[a]1,780	[a]1,010	469	2,270	874	1,300
5	4,310	8,170	3,580	4,420	[a]4,500	914	1,680	1,490	443	2,050	834	2,860
6	3,860	6,120	4,530	3,520	4,530	795	1,830	955	443	[a]1,920	1,210	3,130
7	[a]4,760	4,140	4,420	[a]3,060	5,100	1,300	[a]1,590	650	443	1,780	8,970	3,240
8	5,660	3,130	3,860	2,590	4,590	1,400	1,350	684	[a]419	1,300	7,490	[a]3,080
9	7,830	2,640	3,800	2,210	3,800	[a]1,470	1,210	1,120	395	1,040	6,920	2,910
10	7,320	2,370	[a]3,740	2,100	3,300	1,540	1,120	1,080	395	834	[a]5,840	2,810
11	7,030	[a]2,460	3,690	3,020	3,130	1,300	1,040	[a]1,560	469	757	4,750	2,700
12	5,950	2,540	6,690	3,080	[a]2,860	1,040	1,170	2,050	469	684	5,100	2,590
13	4,700	2,370	6,010	3,240	2,590	914	1,350	2,210	469	[a]2,160	5,660	2,590
14	[a]4,480	2,970	5,610	[a]3,100	2,320	1,490	[a]1,170	2,000	496	3,630	5,320	2,270
15	4,250	4,590	8,230	2,970	2,000	1,210	996	1,350	[a]646	3,300	3,630	[a]2,080
16	3,970	4,810	8,910	2,640	1,780	[a]1,210	795	874	795	2,430	1,780	1,890
17	3,190	4,750	[a]10,200	6,010	1,590	1,210	795	757	955	1,640	[a]1,730	1,680
18	2,700	[a]4,670	11,400	6,180	1,490	1,040	757	[a]720	955	1,640	1,680	1,680
19	2,430	4,590	13,700	6,460	[a]1,400	914	684	684	1,080	4,080	1,640	1,540
20	2,100	7,660	13,600	10,600	1,300	795	795	955	1,040	[a]3,860	1,590	1,490
21	[a]1,890	8,230	11,300	[a]13,600	1,210	720	[a]776	1,540	1,080	3,630	1,540	1,440
22	1,680	[a]7,940	8,400	16,600	1,120	684	757	1,400	[a]1,140	2,970	1,490	[a]2,040
23	1,640	7,660	5,880	16,300	1,080	[a]634	757	1,490	1,210	2,700	1,440	2,640
24	1,540	8,000	[a]5,740	15,500	1,040	585	720	1,540	1,260	2,430	[a]1,400	4,920
25	1,440	8,690	5,610	15,400	996	554	617	[a]1,310	1,120	2,270	1,350	5,950
26	1,400	9,140	5,380	14,800	[a]955	524	554	1,080	1,260	2,000	1,300	5,950
27	1,300	8,520	5,550	14,800	914	524	496	1,080	1,540	[a]1,750	1,260	5,490
28	[a]3,740	7,550	5,490	[a]11,500	834	496	[a]470	1,080	1,170	1,490	[a]1,260	5,440
29	6,180	[a]7,060	6,980	8,230	834	524	443	1,170	[a]1,330	1,210	1,260	[a]6,410
30	7,770	......	7,030	6,800	[a]796	[a]847	418	1,170	1,490	1,080	1,350	7,380
31	7,890	......	[a]6,520	......	757	......	395	720	......	996	......	6,980

[a] Discharge interpolated.

NOTE.—Daily discharge computed from a rating curve fairly well defined below 7,000 second-feet.

Monthly discharge of Conecuh River at Beck, Ala., for 1912.

[Drainage area, 1,290 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	7,890	1,300	4,060	3.15	3.63
February	9,140	2,370	5,910	4.58	4.94
March	13,700	3,580	6,710	5.20	6.00
April	16,600	2,100	7,340	5.69	6.35
May	5,490	757	2,470	1.91	2.20
June	1,540	496	933	.723	.81
July	1,890	395	1,010	.783	.90
August	2,210	443	1,140	.884	1.02
September	1,540	395	825	.640	.71
October	4,080	684	2,090	1.62	1.87
November	8,970	834	2,710	2.10	2.34
December	7,380	1,260	3,170	2.46	2.84
The year	16,600	395	3,190	2.47	33.61

MOBILE RIVER BASIN.

OOSTANAULA RIVER AT RESACA, GA.

Location.—At the Western & Atlantic Railroad bridge in Resaca, Ga., 3 miles below the junction of Conasauga and Coosawattee rivers and 1 mile above the mouth of Camp Creek.

Records available.—1891 to 1898 (gage heights by the United States Weather Bureau and discharge measurements and gage heights by the United States Geological Survey); 1899 to 1904 partial records of gage heights; continuous records January 1, 1905, to December 31, 1912.

Drainage area.—1,610 square miles.

Gage.—Heavy vertical timber attached to the downstream side of the bridge pier in the middle of the river; datum unchanged.

Channel.—Slightly shifting at and below the station. The left bank is low and overflows during high water for 480 feet.

Discharge measurements.—Usually made from the downstream side of the railroad bridge but at times from a boat at the ferry, about 200 feet above, where the section is somewhat better. No discharge measurements were made at this station during 1912.

Artificial control.—Except on the smaller tributaries there are very few milldams, and these have little or no effect on the flow at the station. The channel is sometimes obstructed by logs under the left span of the bridge.

Accuracy.—A good rating has been developed in previous years for low and medium stages.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Daily gage height, in feet, of Oostanaula River at Resaca, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.2	10.2	8.7	23.5	11.2	7.2	4.2	4.0	2.5	2.6	2.2	1.8
2	8.8	5.6	7.0	19.4	8.6	6.2	5.0	4.6	2.4	2.4	3.0	1.8
3	7.8	5.0	6.3	13.7	7.6	5.0	6.0	4.2	2.4	2.4	2.6	1.8
4	7.0	4.8	6.0	8.6	7.4	7.4	5.6	4.0	2.4	2.4	2.4	3.0
5	6.2	4.6	6.8	7.0	6.8	5.4	6.0	3.8	2.5	3.4	2.3	7.0
6	5.3	4.6	9.2	7.0	7.0	5.4	11.5	3.8	2.6	2.8	2.2	7.5
7	4.5	4.5	9.0	6.8	7.6	5.5	8.6	3.4	2.5	2.4	3.5	7.5
8	4.8	4.4	8.6	6.7	11.0	5.4	6.4	4.0	2.4	2.4	3.5	5.6
9	8.2	4.3	8.0	6.5	9.4	5.2	5.0	6.0	2.2	2.4	3.4	4.0
10	7.2	4.2	8.8	6.2	7.6	5.0	4.6	9.9	2.2	2.4	3.2	2.9
11	6.0	4.2	8.2	6.0	6.0	4.7	5.6	8.2	2.1	2.2	3.0	2.5
12	5.5	4.1	7.5	5.8	6.0	4.5	6.0	6.1	2.1	2.2	2.8	2.3
13	5.2	4.0	7.0	5.6	5.8	4.4	6.4	5.0	2.0	2.0	2.7	2.3
14	4.7	4.2	7.1	5.6	5.6	4.8	5.2	4.6	2.0	2.2	2.5	2.3
15	4.4	13.4	14.4	5.8	5.6	7.0	5.0	4.4	2.0	3.6	2.5	2.3
16	4.2	17.4	19.2	7.8	5.7	7.0	4.6	4.0	2.0	3.0	2.5	2.5
17	3.8	15.0	17.0	10.3	5.6	6.1	4.4	4.0	2.0	2.4	2.5	3.5
18	3.4	12.3	13.3	9.2	5.4	6.4	4.4	5.2	2.0	2.4	2.4	3.2
19	5.7	10.0	8.2	8.5	5.4	5.0	4.9	5.0	3.0	2.8	2.4	3.0
20	5.2	9.2	7.2	7.6	5.2	4.2	4.8	4.5	3.6	6.8	2.4	3.0
21	4.7	8.2	6.5	7.0	5.0	4.0	4.6	4.2	3.6	5.0	2.3	3.0
22	4.0	14.0	6.0	7.0	4.8	4.0	4.6	4.0	3.6	3.2	2.3	3.2
23	4.0	12.0	6.0	16.0	4.6	3.8	4.6	3.8	5.4	3.0	2.3	3.6
24	3.4	9.5	13.2	10.2	4.5	3.8	4.6	3.8	9.0	3.0	2.2	4.6
25	3.4	15.5	16.2	8.3	4.4	5.0	4.4	3.6	5.7	2.8	2.2	5.6
26	3.4	19.5	15.0	7.0	4.2	9.2	4.4	3.6	4.2	2.6	2.1	5.0
27	3.5	14.5	10.0	7.2	4.1	10.0	4.6	3.2	3.0	2.4	2.0	4.8
28	3.5	9.5	8.0	14.0	4.0	7.8	4.4	3.0	2.6	2.2	2.0	4.2
29	10.0	9.3	19.7	13.0	6.7	5.6	4.2	2.6	2.4	2.1	2.0	4.2
30	15.5	......	23.2	14.4	14.3	4.8	4.2	2.6	2.4	2.1	2.0	4.0
31	12.2	......	25.0	......	9.0	......	4.3	2.6	......	2.0	......	7.0

Daily discharge, in second-feet, of Oostanaula River at Resaca, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,050	6,970	5,600	20,100	7,920	4,280	1,900	1,760	870	920	726	560
2	5,690	2,960	4,110	16,000	5,510	3,430	2,500	2,200	820	820	1,140	560
3	4,800	2,500	3,510	10,300	4,630	2,500	3,270	1,900	820	820	920	560
4	4,110	2,350	3,270	5,510	4,450	4,450	2,960	1,760	820	820	820	1,140
5	3,430	2,200	3,940	4,110	3,940	2,800	3,270	1,630	870	1,380	772	4,110
6	2,730	2,200	6,050	4,110	4,110	2,800	8,210	1,630	920	1,030	726	4,540
7	2,120	2,120	5,870	3,940	4,630	2,880	5,510	1,380	870	820	1,440	4,540
8	2,350	2,040	5,510	3,850	7,730	2,800	3,600	1,760	820	820	1,440	2,960
9	5,160	1,970	4,980	3,680	6,230	2,650	2,500	3,270	726	820	1,380	1,760
10	4,280	1,900	5,690	3,430	4,630	2,500	2,200	6,690	726	820	1,260	1,080
11	3,270	1,900	5,160	3,270	3,270	2,270	2,960	5,160	682	726	1,140	870
12	2,880	1,830	4,540	3,110	3,270	2,120	3,270	3,350	682	726	1,030	772
13	2,650	1,760	4,110	2,960	3,110	2,040	3,600	2,500	640	640	972	772
14	2,270	1,900	4,200	2,960	2,960	2,350	2,650	2,200	640	726	870	772
15	2,040	10,100	11,000	3,110	2,960	4,110	2,500	2,040	640	1,500	870	772
16	1,900	14,000	15,800	4,800	3,040	4,110	2,200	1,760	640	1,140	870	870
17	1,630	11,600	13,600	7,060	2,960	3,350	2,040	1,760	640	820	870	1,440
18	1,380	8,980	9,950	6,050	2,800	3,600	2,040	2,650	640	820	820	1,260
19	3,040	6,780	5,160	5,420	2,800	2,500	2,420	2,500	1,140	1,030	820	1,140
20	2,650	6,050	4,280	4,630	2,650	1,900	2,350	2,120	1,500	3,940	820	1,140
21	2,270	5,160	3,680	4,110	2,500	1,760	2,200	1,900	1,500	2,500	772	1,140
22	1,760	10,600	3,270	4,110	2,350	1,760	2,200	1,760	1,500	1,260	772	1,260
23	1,760	8,690	3,270	12,600	2,200	1,630	2,200	1,630	2,800	1,140	772	1,500
24	1,380	6,320	9,860	6,970	2,120	1,630	2,200	1,630	5,870	1,140	726	2,200
25	1,380	12,100	12,800	5,240	2,040	2,500	2,040	1,500	3,040	1,030	726	2,960
26	1,380	16,100	11,600	4,110	1,900	6,050	2,040	1,500	1,900	920	682	2,500
27	1,440	11,100	6,780	4,280	1,830	6,780	2,200	1,260	1,140	820	640	2,350
28	1,440	6,320	4,980	10,600	1,760	4,800	2,040	1,140	920	726	640	1,900
29	6,780	6,140	16,300	9,660	3,850	2,960	1,900	920	820	682	640	1,900
30	12,100	......	19,800	11,000	10,900	2,350	1,900	920	820	682	640	1,760
31	8,880	......	21,600	......	5,870	......	1,970	920	......	640	......	4,110

NOTE.—Daily discharge computed from a rating curve well defined below 7,700 second-feet.

Monthly discharge of Oostanaula River at Resaca, Ga., for 1912.

[Drainage area, 1,610 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	12,100	1,380	3,390	2.11	2.43
February	16,100	1,760	6,020	3.74	4.03
March	21,600	3,270	7,750	4.81	5.54
April	20,100	2,960	6,370	3.96	4.42
May	10,900	1,760	3,900	2.42	2.79
June	6,780	1,630	3,060	1.90	2.12
July	8,210	1,900	2,740	1.70	1.96
August	6,690	920	2,100	1.30	1.50
September	5,870	640	1,210	.752	.84
October	3,940	640	1,050	.652	.75
November	1,440	640	891	.553	.62
December	4,540	560	1,780	1.11	1.28
The year	21,600	560	3,350	2.08	28.28

COOSA RIVER AT RIVERSIDE, ALA.

Location.—At the Southern Railway bridge at Riverside, Ala., 1 mile above the mouth of Blue Eye Creek and about 7 miles above Choccolocco Creek.

Records available.—September 25, 1896, to December 31, 1912.

Drainage area.—7,060 square miles.

Gage.—Standard chain gage attached to the right-bank end of the downstream side of the railroad bridge. The original wire gage was located on the downstream side of the bridge near the middle of the river. The gage datum has not been changed since the station was established.

Channel.—For a part of the width the current is broken by a ledge above. Both banks are high and do not overflow, and the bed of the stream is rocky and permanent.

Discharge measurements.—Made from the downstream side of the railroad bridge. No discharge measurements were made at this station during 1912.

Artificial control.—The flow is not noticeably affected by artificial control at the comparatively few dams above. Four navigation locks have been constructed, the nearest of which is Lock 4, about 4 miles above the station.

Daily gage height, in feet, of Coosa River at Riverside, Ala., for 1912.

[J. E. Whitehead, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.0	11.6	13.6	16.5	11.2	9.0	4.2	2.5	2.0	2.0	1.7	1.5
2	8.3	11.3	13.2	16.5	10.4	7.8	4.2	2.5	2.0	1.9	1.7	1.5
3	7.8	10.0	11.6	16.0	9.3	5.3	4.3	2.5	1.8	1.8	1.7	1.5
4	7.2	8.0	9.7	15.5	8.0	4.2	4.8	2.5	1.8	2.2	1.6	1.5
5	6.3	6.0	7.2	14.5	6.8	4.0	5.4	2.5	1.8	2.0	1.6	1.8
6	5.3	4.8	7.6	13.6	6.4	4.0	5.0	2.3	1.8	2.6	1.6	4.0
7	4.6	4.4	8.2	11.4	6.4	4.0	7.0	2.2	1.8	3.0	1.6	4.7
8	5.5	4.0	8.6	8.2	7.3	3.8	7.4	2.2	1.8	3.2	1.6	4.7
9	7.6	3.8	9.0	6.0	8.2	3.7	6.5	2.4	1.8	2.4	1.6	4.4
10	8.0	3.8	8.6	5.6	8.3	3.6	5.0	3.6	1.8	2.0	2.4	4.0
11	7.8	4.0	8.0	5.4	7.3	3.3	4.7	6.6	1.8	1.8	2.6	3.4
12	6.9	4.0	7.6	5.2	6.1	3.0	5.6	7.5	1.8	1.7	2.3	3.0
13	6.0	4.0	7.0	5.0	5.4	3.0	6.9	6.5	1.7	1.8	2.0	2.6
14	5.0	4.2	6.6	5.0	5.0	3.5	7.6	5.0	1.7	2.0	1.8	2.0
15	4.6	6.2	11.6	4.8	4.8	4.2	7.0	3.6	1.6	2.2	1.7	2.0
16	4.2	8.8	14.2	6.0	4.4	6.8	5.8	3.0	1.6	2.0	1.7	2.0
17	3.8	10.8	14.3	9.0	4.2	7.8	5.0	3.0	1.6	1.9	1.7	2.0
18	3.5	11.3	14.0	9.4	4.0	6.8	4.8	4.0	2.0	1.8	1.7	2.1
19	3.4	11.2	13.6	9.2	3.8	5.6	4.6	3.8	2.3	2.7	1.6	2.3
20	3.4	10.4	12.0	8.6	3.7	4.0	4.5	3.6	2.2	2.8	1.6	2.6
21	4.0	9.0	10.0	7.6	3.5	3.2	5.2	3.4	2.0	3.8	1.6	2.5
22	4.0	9.0	8.8	10.6	3.4	3.0	5.8	3.4	2.0	4.8	1.6	2.6
23	3.8	9.6	8.6	12.6	3.3	3.0	4.4	3.2	2.3	4.4	1.6	2.8
24	3.5	11.0	10.3	12.5	3.0	3.0	4.0	3.0	2.4	3.0	1.6	3.6
25	3.2	11.6	12.2	11.8	2.8	3.0	3.5	3.0	4.3	2.8	1.6	4.0
26	3.0	12.6	12.4	10.8	2.8	3.2	3.4	3.0	5.3	2.2	1.5	4.3
27	3.0	14.3	12.0	10.0	2.8	4.0	3.4	3.0	4.8	2.0	1.5	4.5
28	3.2	14.2	11.6	10.5	2.9	5.8	3.0	2.8	3.3	2.0	1.5	4.2
29	6.3	13.9	15.0	10.7	3.0	6.9	2.8	2.6	2.6	1.8	1.5	3.7
30	9.2	......	16.0	12.0	5.4	5.9	2.6	2.2	2.0	1.8	1.5	3.7
31	11.4	......	16.0	......	8.0	......	2.5	2.2	......	1.7	......	3.8

Daily discharge, in second-feet, of Coosa River at Riverside, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	29,800	40,900	49,400	61,800	39,200	29,800	11,000	5,700	4,380	4,380	3,660	3,220
2	26,900	39,600	47,700	61,800	35,800	24,800	11,000	5,700	4,380	4,130	3,660	3,220
3	24,800	34,100	40,900	59,600	31,100	14,900	11,300	5,700	3,890	3,890	3,660	3,220
4	22,300	25,600	32,800	57,500	25,600	11,000	13,100	5,700	3,890	4,900	3,430	3,220
5	18,700	17,500	22,300	53,200	20,600	10,300	15,300	5,700	3,890	4,380	3,430	3,890
6	14,900	13,100	23,900	49,400	19,000	10,300	13,800	5,160	3,890	5,970	3,430	10,300
7	12,400	11,700	26,400	40,000	19,000	10,300	21,400	4,900	3,890	7,140	3,430	12,700
8	15,600	10,300	28,100	26,400	22,700	9,660	23,100	4,900	3,890	7,750	3,430	12,700
9	23,900	9,660	29,800	17,500	26,400	9,340	19,400	5,420	3,890	5,420	3,430	11,700
10	25,600	9,660	28,100	16,000	26,900	9,020	13,800	9,020	3,890	4,380	5,420	10,300
11	24,800	10,300	25,600	15,300	22,700	8,060	12,700	19,800	3,890	3,890	5,970	8,380
12	21,000	10,300	23,900	14,500	17,900	7,140	16,000	23,500	3,890	3,660	5,160	7,140
13	17,500	10,300	21,400	13,800	15,300	7,140	21,000	19,400	3,660	3,890	4,380	5,970
14	13,800	11,000	19,800	13,800	13,800	8,700	23,900	13,800	3,660	4,380	3,890	4,380
15	12,400	18,300	48,900	13,100	13,100	11,000	21,400	9,020	3,430	4,900	3,660	4,380
16	11,000	29,000	52,000	17,500	11,700	20,600	16,800	7,140	3,430	4,380	3,660	4,380
17	9,660	37,500	52,400	29,800	11,000	24,800	13,800	7,140	3,430	4,130	3,660	4,380
18	8,700	39,600	51,100	31,500	10,300	20,600	13,100	10,300	4,380	3,890	3,660	4,640
19	8,380	39,200	49,400	30,700	9,660	16,000	12,400	9,660	5,160	6,250	3,430	5,160
20	8,380	35,800	42,600	28,100	9,340	10,300	12,000	9,020	4,900	6,540	3,430	5,970
21	10,300	29,800	34,100	23,900	8,700	7,750	14,500	8,380	4,380	9,660	3,430	5,700
22	10,300	29,800	29,000	36,600	8,380	7,140	16,800	8,380	4,380	13,100	3,430	5,970
23	9,660	32,400	28,100	45,100	8,060	7,140	11,700	7,750	5,160	11,700	3,430	6,540
24	8,700	38,300	35,300	44,700	7,140	7,140	10,300	7,140	5,420	7,140	3,430	9,020
25	7,750	40,900	43,400	41,700	6,540	7,140	8,700	7,140	11,300	6,540	3,430	10,300
26	7,140	45,100	44,300	37,500	6,540	7,750	8,380	7,140	14,900	4,900	3,220	11,300
27	7,140	52,400	42,600	34,100	6,540	10,300	8,380	7,140	13,100	4,380	3,220	12,000
28	7,750	52,000	40,900	36,200	6,840	16,800	7,140	6,540	8,060	4,380	3,220	11,000
29	18,700	50,700	55,400	37,000	7,140	21,000	6,540	5,970	5,970	3,890	3,220	9,340
30	30,700	......	59,600	42,600	15,300	17,100	5,970	4,900	4,380	3,890	3,220	9,340
31	40,000	......	59,600	......	25,600	......	5,700	4,900	......	3,660	......	9,660

NOTE.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Coosa River at Riverside, Ala., for 1912.

[Drainage area, 7,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	40,000	7,140	16,400	2.32	2.68
February	52,400	9,660	28,400	4.02	4.34
March	59,600	19,800	38,300	5.42	6.25
April	61,800	13,100	34,400	4.87	5.43
May	39,200	6,540	16,400	2.32	2.68
June	29,800	7,140	12,800	1.81	2.02
July	23,900	5,700	13,600	1.93	2.22
August	23,500	4,900	8,450	1.20	1.38
September	14,900	3,430	5,230	.741	.83
October	13,100	3,660	5,530	.783	.90
November	5,970	3,220	3,700	.524	.58
December	12,700	3,220	7,400	1.05	1.21
The year	61,800	3,220	15,800	2.24	30.52

ALABAMA RIVER AT SELMA, ALA.

Location.—At the highway bridge in Selma, Ala.

Records available.—January 1, 1899, to December 31, 1912. The station was originally established by the United States Army Engineer Corps but in 1890 gage height records were begun by the United States Weather Bureau. Although it is not thought that the discharge rating can be accurately applied farther back than 1899, flow estimates based on earlier gage heights will probably be of some value.

Drainage area.—15,400 square miles.

Gage.—Standard chain gage was installed by the United States Geological Survey March 22, 1906, on the downstream side of the highway bridge. The United States Weather Bureau gage formerly used was in two sections—the low-water portion, reading from —3 to +5.1 feet, being fastened to the lower side of the cofferdam on the second pier, and the upper portion, reading from 5.1 to 55 feet, being fastened to the draw pier. All gages have had the same datum, but the bad condition of a short low-water section caused some error in the low-water readings prior to 1906, especially those of the year 1904.

Channel.—In soft limestone, deep, with swift current, and difficult to sound even at ordinary stages. Both banks are high, but the left is subject to overflow at extreme high water.

Discharge measurements.—Made from the highway bridge to which the gage is attached. No discharge measurements were made at this station during 1912.

Accuracy.—Conditions of flow are somewhat changeable, but a fairly good rating has been developed for recent years.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Daily gage height, in feet, of Alabama River at Selma, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	22.9	40.0	36.1	40.4	34.1	7.1	12.5	5.1	4.6	7.4	2.7	2.0
2	23.6	42.1	34.1	41.7	33.0	10.3	12.5	4.6	4.1	6.6	2.4	1.7
3	23.9	42.5	32.4	41.8	31.3	13.4	11.6	4.5	3.6	5.2	2.2	1.8
4	23.5	40.1	28.4	41.1	28.6	13.3	11.4	4.6	3.3	4.2	2.1	2.0
5	22.5	37.1	26.6	39.7	25.1	11.5	10.6	5.3	3.1	3.7	2.1	4.0
6	20.8	29.2	25.3	37.6	22.4	9.4	10.8	6.0	3.0	3.6	2.1	6.5
7	18.1	21.5	24.3	34.9	20.5	8.7	11.5	5.5	2.8	3.6	2.6	9.6
8	15.5	14.7	24.2	32.3	18.7	8.9	10.8	5.0	2.6	4.4	4.0	11.8
9	17.5	11.3	24.8	28.6	18.4	9.0	10.5	5.4	2.5	5.5	5.0	12.0
10	23.2	10.4	23.2	23.1	19.7	9.0	12.4	8.3	2.4	5.7	5.1	11.7
11	27.0	9.5	22.6	17.8	20.1	8.1	13.4	10.3	2.2	4.9	4.8	10.2
12	27.8	10.2	22.9	15.0	20.0	7.5	12.4	11.5	2.2	3.9	4.3	8.7
13	26.1	11.5	24.2	14.1	20.8	7.0	11.0	14.9	2.2	3.1	4.0	7.6
14	22.4	11.6	24.9	14.3	22.1	7.5	10.6	16.8	2.2	2.7	3.9	6.6
15	17.8	13.9	28.9	15.7	19.5	10.5	11.9	15.0	2.4	2.5	3.5	5.5
16	13.8	17.9	35.4	17.5	16.2	16.4	13.5	11.5	3.4	2.4	3.0	5.0
17	11.3	20.3	40.7	25.2	13.5	17.6	13.6	8.7	5.6	2.5	2.6	4.5
18	9.7	21.9	44.2	35.9	12.1	15.9	13.5	7.6	6.5	3.0	2.4	4.4
19	8.9	23.0	46.2	41.8	11.2	14.7	16.8	9.2	5.3	6.4	2.2	4.3
20	8.8	23.1	46.4	44.2	10.5	13.4	17.6	9.8	4.4	6.3	2.2	4.5
21	10.2	22.5	45.1	46.2	10.0	11.1	14.8	9.0	4.0	8.1	2.3	4.7
22	10.9	22.7	42.5	47.3	9.5	9.1	12.8	7.6	4.2	9.4	2.2	4.6
23	9.6	24.0	39.0	48.4	9.2	7.6	10.8	6.9	4.3	9.0	2.1	4.5
24	8.9	25.5	35.5	48.6	8.9	6.7	10.8	6.9	4.6	7.9	1.9	8.0
25	8.2	28.5	34.2	48.6	8.5	6.2	9.9	6.8	8.0	7.7	1.9	13.3
26	7.6	31.8	35.6	48.2	8.2	6.8	8.4	6.6	9.7	6.8	1.9	17.3
27	7.0	36.0	37.0	46.8	8.0	6.9	7.4	6.8	8.5	5.4	1.8	17.9
28	6.6	37.0	37.0	43.9	7.7	7.1	6.6	7.1	8.7	4.4	1.8	16.7
29	11.4	37.0	37.0	39.8	7.4	8.1	6.3	6.9	8.8	3.7	1.9	15.0
30	25.3	......	37.1	36.3	7.2	10.3	5.8	6.2	8.1	3.2	1.9	13.5
31	33.9	......	38.5	......	7.1	......	5.5	5.5	......	3.0	......	11.8

Daily discharge, in second-feet, of Alabama River at Selma, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	59,600	108,000	96,300	109,000	90,700	19,800	32,200	15,600	14,600	20,500	10,900	9,600
2	61,500	114,000	90,700	113,000	87,600	27,000	32,200	14,600	13,600	18,800	10,400	9,060
3	62,300	115,000	85,900	113,000	82,800	34,400	30,000	14,400	12,600	15,800	9,980	9,240
4	61,200	108,000	74,700	111,000	75,300	34,200	29,600	14,600	12,100	13,800	9,790	9,600
5	58,600	99,200	69,700	107,000	65,600	29,800	27,700	16,000	11,700	12,800	9,790	13,400
6	54,000	77,000	66,100	101,000	58,300	24,900	28,100	17,500	11,500	12,600	9,790	18,600
7	46,700	55,800	63,400	92,900	53,200	23,300	29,800	16,400	11,100	12,600	10,700	25,400
8	39,900	37,800	63,100	85,600	48,300	23,800	28,100	15,400	10,700	14,200	13,400	29,300
9	45,100	29,300	64,800	75,300	47,500	24,000	27,400	16,200	10,600	16,400	15,400	31,000
10	60,400	27,200	60,400	60,200	51,000	24,000	32,000	22,500	10,400	16,900	15,600	30,300
11	70,800	25,200	58,800	45,900	52,100	22,000	34,400	27,000	9,980	15,200	15,000	26,800
12	73,000	26,800	59,600	38,600	51,800	20,700	32,000	29,800	9,980	13,200	14,000	23,300
13	68,300	29,800	63,100	36,300	54,000	19,600	28,600	38,300	9,980	11,700	13,400	20,900
14	58,300	30,000	65,000	36,800	57,500	20,700	27,700	43,300	9,980	10,900	13,200	18,800
15	45,900	35,700	76,100	40,400	50,400	27,400	30,800	38,600	10,400	10,600	12,400	16,400
16	35,500	46,100	94,300	45,100	41,700	42,200	34,700	29,800	12,300	10,400	11,500	15,400
17	29,300	52,600	110,000	65,800	34,700	45,400	35,000	23,300	16,700	10,600	10,700	14,400
18	25,600	56,900	120,000	95,700	31,200	40,900	34,700	20,900	18,600	11,500	10,400	14,200
19	23,800	59,900	126,000	113,000	29,100	37,800	43,300	24,500	16,000	18,300	9,980	14,000
20	23,600	60,200	126,000	120,000	27,400	34,400	45,400	25,800	14,200	18,100	9,980	14,400
21	26,800	58,600	122,000	126,000	26,300	28,800	38,100	24,000	13,400	22,000	10,200	14,800
22	28,400	59,100	115,000	129,000	25,200	24,200	33,000	20,900	13,800	24,900	9,980	14,600
23	25,400	62,600	105,000	132,000	24,500	20,900	28,100	19,400	14,000	24,000	9,790	14,400
24	23,800	66,600	94,600	133,000	23,800	19,000	28,100	19,400	14,600	21,600	9,420	21,800
25	22,200	75,000	91,000	133,000	22,900	17,900	26,100	19,200	21,800	21,100	9,420	34,200
26	20,900	84,200	94,900	132,000	22,200	19,200	22,700	18,800	25,600	19,200	9,420	44,600
27	19,600	96,000	98,900	127,000	21,800	19,400	20,500	19,200	22,900	16,200	9,240	46,100
28	18,800	98,900	98,900	119,000	21,100	19,800	18,800	19,800	23,300	14,200	9,240	43,000
29	29,600	98,900	98,900	107,000	20,500	22,000	18,100	19,400	23,600	12,800	9,420	38,600
30	66,100	......	99,200	96,900	20,000	27,000	17,100	17,900	22,000	11,900	9,420	34,700
31	90,100	......	103,000	......	19,800	......	16,400	16,400	......	11,500	......	30,500

Note.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Alabama River at Selma, Ala., for 1912.

[Drainage area, 15,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	90,100	18,800	44,400	2.88	3.32
February	115,000	25,200	65,300	4.24	4.57
March	126,000	58,800	88,900	5.77	6.65
April	133,000	36,300	94,700	6.15	6.86
May	90,700	19,800	43,200	2.81	3.24
June	45,400	17,900	26,500	1.72	1.92
July	45,400	16,400	29,400	1.91	2.20
August	43,300	14,400	21,900	1.42	1.64
September	25,600	9,980	14,700	.955	1.07
October	24,900	10,400	15,600	1.01	1.16
November	15,600	9,240	11,100	.721	.80
December	46,100	9,060	22,600	1.47	1.70
The year	133,000	9,060	39,700	2.58	35.13

ETOWAH RIVER NEAR BALL GROUND, GA.

Location.—At the iron wagon bridge about 3 miles southeast of Ball Ground, Ga., and one-fourth mile below the mouth of Longswamp Creek.

Records available.—May 16, 1907, to December 31, 1912.

Drainage area.—466 square miles.

Gage.—A standard chain gage, attached to the upstream side of the bridge, was installed August 18, 1908, replacing the vertical staff gage, located 75 feet below the bridge. The chain gage was set to read with the vertical staff at low stages and will differ only very slightly at other stages.

Channel.—The left bank does not overflow, but the right bank overflows about 500 feet beyond the end of the bridge approach at high stages. The current is somewhat broken and is disturbed by a rough, rocky bed and curved channel above.

Discharge measurements.—Made from the uptsream side of the wagon bridge. No discharge measurements were made at this station during 1912.

Artificial control.—The operation of a number of mills above may cause slight variations in flow. On this account the gage is read twice a day.

Accuracy.—The rating is somewhat affected by shifting of the stream bed some distance below the station.

Daily gage height, in feet, of Etowah River near Ball Ground, Ga., for 1912.

[R. O. Ellis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.5	4.6	5.0	6.2	5.6	4.2	4.1	4.2	3.2	3.3	3.3	2.95
2	4.5	4.2	4.8	6.0	5.3	4.1	4.0	3.8	3.1	3.2	3.3	3.0
3	4.4	4.0	4.8	5.8	5.2	4.3	6.3	3.7	3.1	3.1	3.1	3.2
4	4.0	4.0	5.3	5.5	5.3	5.3	4.9	3.7	3.4	6.0	3.1	3.3
5	3.8	3.8	5.2	5.4	5.1	4.2	5.1	3.7	3.5	4.5	3.0	3.4
6	3.6	3.7	6.8	5.3	5.1	4.3	4.7	3.6	4.3	3.7	3.1	3.9
7	3.5	3.6	5.6	5.3	6.2	4.6	4.2	3.5	3.3	3.4	4.2	3.6
8	3.7	3.5	5.2	5.2	5.4	4.4	4.1	4.0	3.6	3.2	3.6	3.3
9	4.5	3.5	5.4	5.1	5.1	4.1	4.2	7.0	3.2	3.2	3.4	3.2
10	4.0	3.7	5.1	5.0	4.9	3.9	4.9	5.6	3.1	3.1	3.3	3.1
11	3.8	3.7	4.8	5.0	4.9	3.9	9.3	4.3	3.1	3.1	3.2	3.1
12	3.8	3.6	5.0	4.9	4.8	3.8	7.2	4.0	2.8	3.1	3.1	3.0
13	3.7	3.5	5.0	4.9	4.7	3.8	5.4	3.8	3.0	3.0	3.2	3.0
14	3.6	3.7	4.8	4.9	4.6	9.1	5.4	3.7	3.2	3.5	3.4	3.0
15	3.5	8.2	18.4	5.8	4.6	6.6	5.0	3.6	4.8	3.4	3.3	2.9
16	3.4	6.6	11.2	6.9	4.6	5.6	4.5	4.0	3.9	3.2	3.2	2.95
17	3.3	5.2	7.2	6.4	4.4	4.7	4.5	4.8	3.3	3.1	3.1	3.0
18	3.4	5.2	5.7	5.6	4.4	4.4	5.5	4.4	3.2	3.1	3.1	3.3
19	4.1	4.8	5.5	5.2	4.3	4.2	5.6	4.0	3.1	8.3	3.0	3.2
20	3.6	4.9	5.3	5.4	4.3	4.0	4.8	3.6	3.0	5.9	3.0	3.1
21	3.4	8.0	5.2	5.2	4.2	3.9	5.1	3.5	2.95	4.1	3.0	3.0
22	3.3	6.4	5.0	8.6	4.2	3.9	4.5	3.6	3.7	3.8	3.0	3.0
23	3.3	5.0	5.4	7.5	4.2	3.8	4.7	3.6	8.0	3.6	3.0	3.5
24	3.3	5.4	8.6	5.7	4.2	4.6	4.6	3.7	5.1	3.5	2.95	4.5
25	3.3	10.7	6.7	5.4	4.1	6.8	4.2	3.7	3.9	3.4	2.95	3.6
26	3.2	9.3	5.7	5.2	4.0	7.2	4.0	3.6	3,6	3.3	2.95	3.4
27	3.2	7.7	5.4	6.4	4.2	5.0	3.8	3.4	3.5	3.2	2.9	3.6
28	3.3	6.0	6.3	5.6	4.9	4.4	3.8	3.3	3.5	3.2	3.0	3.4
29	10.0	5.4	15.4	6.1	7.9	4.2	3.8	3.3	3.5	3.2	3.0	3.3
30	9.0	......	8.2	6.5	5.2	4.1	3.7	3.2	3.4	3.1	2.95	3.6
31	5.7	......	6.6	......	4.4	......	3.7	3.2	......	3.1	......	3.9

Daily discharge, in second-feet, of Etowah River near Ball Ground, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,020	1,430	1,680	2,520	2,090	1,200	1,140	1,200	690	735	735	580
2	1,370	1,200	1,550	2,370	1,880	1,140	1,080	980	645	690	735	600
3	1,310	1,080	1,550	2,230	1,810	1,250	2,600	930	645	645	645	690
4	1,080	1,080	1,880	2,020	1,880	1,880	1,620	930	780	2,370	645	735
5	980	980	1,810	1,950	1,740	1,200	1,740	930	830	1,370	600	780
6	880	930	2,970	1,880	1,740	1,250	1,490	880	1,250	930	645	1,030
7	830	880	2,090	1,880	2,520	1,430	1,200	830	735	780	1,200	880
8	930	830	1,810	1,810	1,950	1,310	1,140	1,080	880	690	880	735
9	1,370	830	1,950	1,740	1,740	1,240	1,200	3,130	690	690	780	690
10	1,080	930	1,740	1,680	1,620	1,030	1,620	2,090	645	645	735	645
11	980	930	1,550	1,680	1,620	1,030	5,050	1,250	645	645	690	645
12	980	880	1,680	1,620	1,550	980	3,290	1,080	520	645	645	600
13	930	830	1,680	1,620	1,490	980	1,950	980	600	600	690	600
14	880	930	1,550	1,620	1,430	4,870	1,950	930	690	830	780	600
15	830	4,100	14,300	2,230	1,430	2,820	1,680	880	1,550	780	735	560
16	780	2,820	6,820	3,050	1,430	2,090	1,370	1,080	1,030	690	690	580
17	735	1,810	3,290	2,670	1,310	1,490	1,370	1,550	735	645	645	600
18	780	1,810	2,160	2,090	1,310	1,310	2,020	1,310	690	645	645	735
19	1,140	1,550	2,020	1,810	1,250	1,200	2,090	1,080	645	4,180	600	690
20	880	1,620	1,880	1,950	1,250	1,080	1,550	880	600	2,300	600	645
21	780	3,930	1,810	1,810	1,200	1,030	1,740	830	580	1,140	600	600
22	735	2,670	1,680	4,440	1,200	1,030	1,370	880	930	980	600	600
23	735	1,680	1,950	3,530	1,200	980	1,490	880	3,930	880	600	830
24	735	1,950	4,440	2,160	1,200	1,430	1,430	930	1,740	830	580	1,370
25	735	6,340	2,900	1,950	1,140	2,970	1,200	930	1,030	780	580	880
26	690	5,050	2,160	1,810	1,080	3,290	1,080	880	880	735	580	780
27	690	3,690	1,950	2,670	1,200	1,680	980	780	830	690	560	880
28	735	2,370	2,600	2,090	1,620	1,310	980	735	830	690	600	780
29	5,680	1,950	11,000	2,440	3,850	1,200	980	735	830	690	600	735
30	4,780	......	4,100	2,740	1,810	1,140	930	690	780	645	580	880
31	2,160	......	2,820	......	1,310	......	930	690	......	645	......	1,030

Note.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Etowah River near Ball Ground, Ga., for 1912.

[Drainage area, 466 square miles.]

Month.	Discharge in second-feet.				Run-off on drainage area (depth in inches).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	5,680	690	1,270	2.73	3.15
February	6,340	830	1,970	4.23	4.56
March	14,300	1,550	3,010	6.46	7.45
April	4,440	1,620	2,200	4.72	5.27
May	3,850	1,080	1,610	3.45	3.98
June	4,870	980	1,560	3.35	3.74
July	5,050	930	1,620	3.48	4.01
August	3,130	690	1,060	2.27	2.62
September	3,930	520	928	1.99	2.22
October	4,180	600	975	2.09	2.41
November	1,200	560	673	1.44	1.61
December	1,370	560	741	1.59	1.83
The year	14,300	520	1,470	3.15	42.85

ETOWAH RIVER NEAR ROME, GA.

Location.—At Freemans Ferry, 5 miles above Rome, Ga., where Etowah and Oostanaula rivers unite to form Coosa River; 1 mile below mouth of Dikes Creek.

Records available.—August 17, 1904, to December 31, 1912.

Drainage area.—1,800 square miles.

Gage.—Vertical gage in three sections, on left bank 250 feet below the ferry; datum unchanged.

Channel.—Both banks are subject to overflow during high water.

Discharge measurements.—Made from the ferryboat or from a small boat held in place by the ferry cable. No measurements can be made at high stages. No discharge measurements were made at this station during 1912.

Artificial control.—The operation of the few milldams above will seldom affect the flow, but to provide for possible daily fluctuations the gage is read twice a day.

Accuracy.—Conditions of flow are probably permanent, and an excellent rating has been developed in previous years for low and medium stages.

Daily gage height, in feet, of Etowah River near Rome, Ga., for 1912.

[R. M. Pattillo, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.7	4.9	4.6	8.9	5.4	3.5	3.6	3.3	2.5	2.5	2.5	2.3
2	4.4	4.0	4.1	7.6	4.8	3.3	4.2	3.0	2.45	2.5	2.4	2.6
3	4.3	3.6	4.0	5.9	4.3	3.2	4.2	2.9	2.4	2.45	2.4	2.6
4	4.1	3.4	4.3	4.5	5.0	4.0	4.0	2.8	2.4	3.4	2.4	2.35
5	3.4	3.2	4.6	4.4	4.5	3.9	5.0	2.8	2.4	5.4	2.3	2.6
6	3.0	3.1	6.7	4.3	4.2	3.6	4.4	2.8	2.7	4.0	2.35	2.8
7	2.7	3.0	6.1	4.2	7.2	3.4	3.9	2.7	2.8	2.8	2.6	2.9
8	2.5	3.0	4.8	4.2	7.4	3.8	3.8	2.9	2.5	2.6	3.0	2.6
9	4.4	2.8	4.8	4.1	5.2	4.0	4.7	9.5	2.45	2.6	2.8	2.6
10	3.8	2.8	4.6	4.0	4.4	3.6	6.0	6.5	2.4	2.5	2.6	2.5
11	3.4	2.9	4.2	4.0	4.3	3.2	7.3	4.2	2.4	2.5	2.6	2.5
12	3.2	3.0	4.0	3.9	4.2	3.0	8.4	3.5	2.3	2.45	2.5	2.5
13	3.1	2.9	4.2	3.9	4.0	3.4	6.8	3.2	2.3	2.4	2.6	2.45
14	3.0	3.1	4.0	3.8	3.9	10.1	5.1	3.1	2.25	2.35	2.8	2.4
15	2.9	9.1	13.6	3.6	3.8	8.6	4.6	3.0	3.0	2.8	2.8	2.4

Daily gage height, in feet, of Etowah River near Rome, Ga., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	2.8	10.4	19.2	5.0	3.7	6.5	4.1	2.9	3.0	2.7	2.6	2.35
17	2.8	6.0	14.4	6.3	3.6	5.5	3.7	3.0	2.7	2.6	2.5	2.7
18	2.7	4.6	7.2	5.4	3.5	4.2	4.1	5.0	2.5	2.5	2.5	2.6
19	2.8	4.4	5.0	4.6	3.4	3.6	4.4	4.2	2.4	3.2	2.4	2.6
20	3.2	4.0	4.6	4.7	3.4	3.4	4.7	3.2	2.3	5.6	2.4	2.5
21	3.0	7.0	4.4	4.8	3.3	3.2	3.9	3.0	2.3	4.1	2.4	2.5
22	3.0	9.0	4.2	7.2	3.2	3.1	3.6	2.9	2.6	3.4	2.35	2.4
23	3.0	5.8	4.3	11.4	3.2	3.0	3.4	2.8	7.0	3.0	2.3	2.45
24	2.9	4.9	7.0	8.5	3.2	3.3	3.2	2.8	7.8	2.8	2.3	3.8
25	2.8	9.3	5.6	4.8	3.2	3.9	3.1	2.7	4.8	2.7	2.25	3.4
26	2.6	14.6	5.0	4.4	3.3	6.0	3.2	2.8	3.0	2.7	2.2	3.1
27	2.45	11.8	4.7	4.6	3.3	7.9	3.2	2.9	2.8	2.6	2.15	2.8
28	2.4	7.5	5.2	6.0	3.2	4.5	3.0	2.7	2.6	2.6	2.4	2.8
29	5.2	5.4	19.2	5.8	8.0	3.6	2.9	2.6	2.6	2.6	2.4	2.7
30	11.9	......	20.2	6.6	9.4	3.5	2.8	2.6	2.5	2.5	2.3	2.7
31	8.8	......	12.6	......	4.4	......	3.1	2.5	......	2.4	......	2.5

Daily discharge, in second-feet, of Etowah River near Rome, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,260	5,620	5,080	12,800	6,520	3,130	3,300	2,800	1,660	1,660	1,660	1,420
2	4,720	4,000	4,180	10,500	5,440	2,800	4,360	2,340	1,600	1,660	1,540	1,790
3	4,540	3,300	4,000	7,420	4,540	2,640	4,360	2,200	1,540	1,600	1,540	1,790
4	4,180	2,960	4,540	4,900	5,800	4,000	4,000	2,060	1,540	2,960	1,540	1,480
5	2,960	2,640	5,080	4,720	4,900	3,820	5,800	2,060	1,540	6,520	1,420	1,790
6	2,340	2,490	8,860	4,540	4,360	3,300	4,720	2,060	1,920	4,000	1,480	2,060
7	1,920	2,340	7,780	4,360	9,760	2,960	3,820	1,920	2,060	2,060	1,790	2,200
8	1,660	2,340	5,440	4,360	10,100	3,640	3,640	2,200	1,660	1,790	2,340	1,790
9	4,720	2,060	5,440	4,180	6,160	4,000	5,260	13,900	1,600	1,790	2,060	1,790
10	3,640	2,060	5,080	4,000	4,720	3,300	7,600	8,500	1,540	1,660	1,790	1,660
11	2,960	2,200	4,360	4,000	4,540	2,640	9,940	4,360	1,540	1,660	1,790	1,660
12	2,640	2,340	4,000	3,820	4,360	2,340	11,900	3,130	1,420	1,600	1,660	1,660
13	2,490	2,200	4,360	3,820	4,000	2,960	9,040	2,640	1,420	1,540	1,790	1,600
14	2,340	2,490	4,000	3,640	3,820	15,000	5,980	2,490	1,360	1,480	2,060	1,540
15	2,200	13,200	21,300	3,300	3,640	12,300	5,080	2,340	2,340	2,060	2,060	1,540
16	2,060	15,500	31,400	5,800	3,470	8,500	4,180	2,200	2,340	1,920	1,790	1,480
17	2,060	7,600	22,700	8,140	3,300	6,700	3,470	2,340	1,920	1,790	1,660	1,920
18	1,920	5,080	9,760	6,520	3,130	4,360	4,180	5,800	1,660	1,660	1,660	1,790
19	2,060	4,720	5,800	5,080	2,960	3,300	4,720	4,360	1,540	2,640	1,540	1,790
20	2,640	4,000	5,080	5,260	2,960	2,960	5,260	2,640	1,420	6,880	1,540	1,660
21	2,340	9,400	4,720	5,440	2,800	2,640	3,820	2,340	1,420	4,180	1,540	1,660
22	2,340	13,000	4,360	9,760	2,640	2,490	3,300	2,200	1,790	2,960	1,480	1,540
23	2,340	7,240	4,540	17,300	2,640	2,340	2,960	2,060	9,400	2,340	1,420	1,600
24	2,200	5,620	9,400	12,100	2,640	2,800	2,640	2,060	10,800	2,060	1,420	3,640
25	2,060	13,500	6,880	5,440	2,640	3,820	2,490	1,920	5,440	1,920	1,360	2,960
26	1,790	23,100	5,800	4,720	2,800	7,600	2,640	2,060	2,340	1,920	1,300	2,490
27	1,600	18,000	5,260	5,080	2,800	11,000	2,640	2,200	2,060	1,790	1,250	2,060
28	1,540	10,300	6,160	7,600	2,640	4,900	2,340	1,920	1,790	1,790	1,540	2,060
29	6,160	6,520	31,400	7,240	11,200	3,300	2,200	1,790	1,790	1,790	1,540	1,920
30	18,200	......	33,200	8,680	13,700	3,130	2,060	1,790	1,660	1,660	1,420	1,920
31	12,600	......	19,500	......	4,720	......	2,490	1,660	......	1,540	......	1,660

NOTE.—Daily discharge computed from a rating curve well defined below 4,000 second-feet. Above 10,000 second-feet the estimates are only approximate.

Monthly discharge of Etowah River near Rome, Ga., for 1912.

[Drainage area, 1,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	18,200	1,540	3,630	2.02	2.33
February	23,100	2,060	6,750	3.75	4.04
March	33,200	4,000	9,660	5.37	6.19
April	17,300	3,300	6,480	3.60	4.02
May	13,700	2,640	4,830	2.68	3.09
June	15,000	2,340	4,620	2.57	2.87
July	11,900	2,060	4,520	2.51	2.89
August	13,900	1,660	3,040	1.69	1.95
September	10,800	1,360	2,400	1.33	1.48
October	6,880	1,480	2,350	1.31	1.51
November	2,340	1,250	1,630	.906	1.01
December	3,640	1,420	1,870	1.04	1.20
The year	33,200	1,250	4,310	2.39	32.58

AMICALOLA RIVER NEAR POTTS MOUNTAIN, GA.

Location.—At a covered wagon bridge, known as Steeles Bridge, 2 miles east of Potts Mountain post office and one-fourth mile above the mouth of Holley Creek; 15 miles from Ball Ground, Ga., which is the nearest railroad station.

Records available.—June 21, 1907, to December 31, 1908; June 7, 1910, to December 31, 1912.

Drainage area.—80 square miles.

Gage.—Vertical staff attached to a tree on the left bank 30 feet below the bridge; datum unchanged.

Channel.—Rocky and permanent at station, but may shift at a bar of small bowlders a short distance below.

Discharge measurements.—Made from the wagon bridge or by wading at low stages. No discharge measurements were made at this station during 1912.

Accuracy.—Published data considered good.

Daily gage height, in feet, of Amicalola River near Potts Mountain, Ga., for 1912.

[J. A. Whitmore, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	2.1	2.3	3.0	2.5	1.9	1.85	1.7	1.55	1.5	1.5	1.5
2	1.8	2.0	2.3	2.9	2.4	1.9	1.9	1.7	1.5	1.5	1.5	1.5
3	1.9	1.9	2.2	2.8	2.4	1.9	2.0	1.7	1.5	1.5	1.5	1.6
4	1.8	1.9	2.2	2.75	2.3	2.1	1.9	1.7	1.5	1.9	1.5	1.6
5	1.8	1.85	2.1	2.7	2.3	2.0	1.9	1.7	1.7	1.6	1.5	1.5
6	1.8	1.8	3.2	2.7	2.3	1.95	2.1	1.7	1.55	1.5	1.5	1.5
7	1.9	1.8	2.5	2.5	3.0	1.95	1.9	1.7	1.5	1.5	1.6	1.5
8	2.0	1.8	2.4	2.4	2.4	1.95	1.85	1.9	1.55	1.5	1.55	1.5
9	2.0	1.8	2.4	2.3	2.3	1.9	1.9	2.0	1.5	1.5	1.5	1.5
10	1.95	1.8	2.4	2.25	2.3	1.85	1.9	2.1	1.5	1.45	1.5	1.5
11	1.95	1.85	2.35	2.2	2.25	1.85	6.4	2.0	1.5	1.45	1.5	1.5
12	2.0	1.85	2.3	2.2	2.25	1.8	2.9	1.9	1.5	1.45	1.55	1.5
13	1.9	1.85	2.2	2.2	2.2	1.8	2.5	1.9	1.55	1.45	1.5	1.5
14	1.85	1.95	2.2	2.2	2.2	1.75	2.2	1.8	1.5	1.6	1.5	1.5
15	1.8	3.0	10.5	2.2	2.1	3.5	2.2	1.75	1.5	1.5	1.5	1.5

Daily gage height, in feet, of Amicalola River near Potts Mountain, Ga., for 1912—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	1.8	2.5	3.7	2.5	2.1	2.0	2.1	1.75	1.5	1.5	1.5	1.5
17	1.75	2.4	2.7	2.4	2.1	1.9	2.1	1.75	1.5	1.5	1.5	1.5
18	1.75	2.2	2.6	2.35	2.1	1.85	2.0	2.0	1.5	1.45	1.5	1.5
19	1.7	2.1	2.5	2.35	2.1	1.8	2.0	1.8	1.45	4.0	1.45	1.6
20	1.7	2.25	2.45	2.3	2.0	1.8	1.9	1.8	1.45	1.8	1.45	1.6
21	1.7	2.1	2.35	2.3	2.0	1.8	1.9	1.75	1.5	1.6	1.45	1.55
22	1.7	2.1	2.3	6.0	1.95	1.75	1.9	1.75	1.5	1.55	1.45	1.55
23	1.7	2.1	2.25	2.7	1.95	1.75	1.9	1.7	3.9	1.55	1.45	1.6
24	1.7	2.2	3.5	2.5	1.95	1.75	1.85	1.65	2.3	1.5	1.45	1.6
25	1.65	2.3	2.7	2.4	1.9	2.4	1.85	1.65	1.9	1.5	1.45	1.6
26	1.65	3.8	2.6	2.3	1.9	2.8	1.85	1.65	1.6	1.5	1.45	1.55
27	1.65	3.5	2.6	2.3	1.9	2.0	1.8	1.6	1.5	1.5	1.5	1.55
28	1.65	2.5	2.7	2.4	2.0	1.9	1.8	1.6	1.5	1.5	1.5	1.5
29	4.8	2.4	12.0	2.9	2.0	1.85	1.75	1.55	1.5	1.5	1.5	1.5
30	3.0	....	3.7	2.6	1.95	1.85	1.75	1.55	1.5	1.45	1.5	1.5
31	2.4	....	3.5	....	1.95	....	1.7	1.55	....	1.45	....	1.5

Daily discharge, in second-feet, of Amicalola River near Potts Mountain, Ga., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	226	334	420	760	510	260	243	194	152	138	138	138
2	226	296	420	710	465	260	260	194	138	138	138	138
3	260	260	375	660	465	260	296	194	138	138	138	165
4	226	260	375	635	420	334	260	194	138	260	138	165
5	226	243	334	610	420	296	260	194	194	165	138	138
6	226	226	860	610	420	278	334	194	152	138	138	138
7	260	226	510	510	760	278	260	194	138	138	165	138
8	296	226	465	465	465	278	243	260	152	138	152	138
9	296	226	465	420	420	260	260	296	138	138	138	138
10	278	226	465	398	420	243	260	334	138	126	138	138
11	278	243	442	375	398	243	2,690	296	138	126	138	138
12	296	243	420	375	398	226	710	260	138	126	152	138
13	260	243	375	375	375	226	510	260	152	126	138	138
14	243	278	375	375	375	210	375	226	138	165	138	138
15	226	760	5,150	375	334	1,020	375	210	138	138	138	138
16	226	510	1,140	510	334	296	334	210	138	138	138	138
17	210	465	610	465	334	260	334	210	138	138	138	138
18	210	375	560	442	334	243	296	296	138	126	138	138
19	194	334	510	442	334	226	296	226	126	1,300	126	165
20	194	398	488	420	296	226	260	226	126	226	126	165
21	194	334	442	420	296	226	260	210	138	165	126	152
22	194	334	420	2,450	278	210	260	210	138	152	126	152
23	194	334	398	610	278	210	260	194	1,250	152	126	165
24	194	375	1,020	510	278	210	243	180	420	138	126	165
25	180	420	610	465	260	465	243	180	260	138	126	165
26	180	1,190	560	420	260	660	243	180	165	138	126	152
27	180	1,020	560	420	260	296	226	165	138	138	138	152
28	180	510	610	465	296	260	226	165	138	138	138	138
29	1,740	465	6,050	710	296	243	210	152	138	138	138	138
30	760	....	1,140	560	278	243	210	152	138	126	138	138
31	465	....	1,020	....	278	....	194	152	....	126	....	138

NOTE.—Daily discharge computed from a rating curve fairly well defined below 300 second-feet.

Monthly discharge of Amicalola River near Potts Mountain, Ga., for 1912.

[Drainage area, 80 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	1,740	180	301	3.76	4.34
February	1,190	226	392	4.90	5.28
March	6,050	334	890	11.1	12.80
April	2,450	375	565	7.06	7.88
May	760	260	366	4.58	5.28
June	1,020	210	298	3.72	4.15
July	2,690	194	369	4.61	5.32
August	334	152	213	2.66	3.07
September	1,250	126	192	2.40	2.68
October	1,300	126	183	2.29	2.64
November	165	126	137	1.71	1.91
December	165	138	146	1.82	2.10
The year	6,050	126	338	4.22	57.45

TALLAPOOSA RIVER AT STURDEVANT, ALA.

Location.—At the Central of Georgia Railway bridge, one-fourth mile west of Sturdevant, Ala., and 5 miles below the mouth of Hillabee Creek.

Records available.—July 19, 1900, to December 31, 1912.

Drainage area.—2,460 square miles.

Gage.—A vertical staff gage on the right bank of the river about 2,000 feet above the bridge. The original gage was a staff in two sections attached to the pier of the railroad bridge. A standard chain gage, installed July 10, 1905, was read until the summer of 1906, when the present gage was installed. The readings of the new staff gage are all corrected to agree with the readings of the standard chain gage, referred to its original datum at the railroad bridge.

Channel.—Rocky and permanent; one side deep and sluggish at low stages. Both banks overflow for about 200 feet at extreme high stages.

Discharge measurements.—Made from a plank walk resting on the lower members of the decked railroad bridge. Some low-water measurements made from boat. No discharge measurements were made at this station during 1912.

Artificial control.—The flow is under no artificial control except at a number of small mills a great distance upstream.

Accuracy.—A good rating has been developed in previous years and excellent results are obtained from this station. Estimates for 1912 are based on 1911 rating.

Daily gage height, in feet, of Tallapoosa River at Sturdevant, Ala., for 1912.

[C. J. Stowe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.0	6.7	4.8	8.5	6.1	3.4	3.2	2.3	2.1	2.3	2.0	1.9
2	4.7	5.6	4.5	6.1	5.4	3.2	4.0	2.2	2.0	2.2	1.9	1.9
3	4.3	4.3	4.5	5.4	4.9	3.3	3.8	2.4	2.0	2.2	1.9	2.0
4	4.0	4.0	4.9	5.0	4.8	3.0	3.9	3.2	1.9	2.2	1.8	3.1
5	3.8	3.9	5.6	4.9	5.2	4.0	4.1	3.0	1.9	3.9	1.8	4.4
6	3.6	3.8	7.1	4.7	4.5	4.0	4.0	2.7	1.9	5.8	1.9	4.2
7	4.3	3.6	6.6	4.6	5.8	4.5	4.3	5.6	1.8	4.0	1.8	3.8
8	9.8	3.5	5.8	4.6	7.1	4.1	3.6	5.0	1.8	3.0	1.8	3.6
9	7.2	3.4	5.6	4.5	6.5	3.7	5.2	5.5	1.7	2.4	1.7	3.3
10	5.9	3.6	5.1	4.4	5.4	3.3	5.2	6.1	1.6	2.2	1.7	3.2

Daily gage height, in feet, of Tallapoosa River at Sturdevant, Ala, for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	4.9	4.7	5.0	4.5	5.0	3.0	4.9	6.5	1.6	2.1	1.8	3.0
12	4.3	4.4	5.8	4.3	5.4	2.9	4.0	5.1	1.6	2.1	1.9	2.9
13	4.0	4.1	5.2	6.0	5.0	3.7	4.9	4.0	1.7	2.0	2.0	2.7
14	3.6	5.0	5.9	4.9	4.6	13.1	4.9	3.2	1.8	2.0	2.0	2.5
15	3.4	6.0	20.3	4.8	4.3	10.0	4.1	3.1	2.3	2.1	2.1	2.3
16	3.2	7.0	17.1	5.7	4.1	6.8	4.5	3.2	2.7	2.1	2.0	2.3
17	3.0	6.3	10.5	12.1	4.0	5.2	6.3	3.7	2.4	2.1	1.9	2.3
18	3.0	5.4	8.3	9.6	3.9	4.1	4.7	4.0	2.2	2.1	1.9	3.0
19	3.4	4.7	6.1	6.8	3.8	3.6	4.1	3.3	2.2	3.8	1.9	2.9
20	3.8	4.2	5.4	7.9	3.7	3.4	3.6	3.0	2.0	4.5	1.9	2.9
21	3.6	6.0	5.0	9.4	3.6	3.2	3.3	2.8	1.9	4.0	1.9	2.7
22	3.2	7.2	4.8	11.5	3.6	3.0	3.0	2.9	1.8	3.2	1.9	2.6
23	3.0	6.7	4.7	12.7	3.5	2.9	2.9	4.7	6.8	2.9	1.9	3.4
24	2.9	8.3	8.6	8.8	3.4	2.7	2.9	3.0	6.0	2.5	1.9	6.0
25	2.9	9.2	8.7	7.2	3.3	3.0	2.7	3.2	4.5	2.3	1.8	5.3
26	2.8	7.8	6.8	5.8	3.3	4.1	3.4	3.4	3.8	2.2	1.8	4.3
27	2.8	7.3	5.8	5.2	3.2	5.0	2.9	3.0	3.0	2.2	1.8	4.0
28	3.7	6.0	5.4	6.1	3.2	4.4	2.6	2.9	2.5	2.0	1.8	3.8
29	17.5	5.3	12.4	7.6	3.2	4.0	2.5	2.5	3.0	2.0	1.9	3.6
30	15.6	......	11.9	6.8	3.4	3.6	2.3	2.3	2.6	1.9	1.9	3.4
31	9.6	......	9.8	......	3.5	......	2.2	2.2	......	2.0	......	3.4

Daily discharge, in second-feet, of Tallapoosa River at Sturdevant, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,760	11,400	6,250	17,200	9,720	3,430	3,110	1,900	1,670	1,900	1,560	1,460
2	6,010	8,330	5,550	9,720	7,800	3,110	4,510	1,780	1,560	1,780	1,460	1,460
3	5,120	5,120	5,550	7,800	6,500	3,270	3,270	2,020	1,560	1,780	1,460	1,560
4	4,510	4,510	6,500	6,760	6,250	2,810	4,320	3,110	1,460	1,780	1,360	2,960
5	4,130	4,320	8,330	6,500	7,280	4,510	4,710	2,810	1,460	4,320	1,360	5,330
6	3,770	4,130	12,700	6,010	5,550	4,510	4,510	2,400	1,460	8,880	1,460	4,910
7	5,120	3,770	11,100	5,770	8,880	5,550	5,120	8,330	1,360	4,510	1,360	4,130
8	21,300	3,600	8,880	5,770	12,700	4,710	3,770	6,760	1,360	2,810	1,360	3,770
9	13,000	3,430	8,330	5,550	10,800	3,950	7,280	8,060	1,270	2,020	1,270	3,270
10	9,160	3,770	7,020	5,330	7,800	3,270	7,280	9,720	1,180	1,780	1,270	3,110
11	6,500	6,010	6,760	5,550	6,760	2,810	6,500	10,800	1,180	1,670	1,360	2,810
12	5,120	5,330	8,880	5,120	7,800	2,670	4,510	7,020	1,180	1,670	1,460	2,670
13	4,510	4,710	7,280	9,440	6,760	3,950	6,500	4,510	1,270	1,560	1,560	2,400
14	3,770	6,760	9,160	6,500	5,770	31,900	6,500	3,110	1,360	1,560	1,560	2,140
15	3,430	9,440	54,400	6,250	5,120	22,000	4,710	2,960	1,900	1,670	1,670	1,900
16	3,110	12,400	44,700	8,600	4,710	11,700	5,550	3,110	2,400	1,670	1,560	1,900
17	2,810	10,300	23,600	28,700	4,510	7,280	10,300	3,950	2,020	1,670	1,460	1,900
18	2,810	7,800	16,500	20,700	4,320	4,710	6,010	4,510	1,780	1,670	1,460	2,810
19	3,430	6,010	9,720	11,700	4,130	3,770	4,710	3,270	1,780	4,130	1,460	2,670
20	4,130	4,910	7,800	15,200	3,950	3,430	3,770	2,810	1,560	5,550	1,460	2,670
21	3,770	9,440	6,760	20,000	3,770	3,110	3,270	2,530	1,460	4,510	1,460	2,400
22	3,110	13,000	6,250	26,800	3,770	2,810	2,810	2,670	1,360	3,110	1,460	2,270
23	2,810	11,400	6,010	30,600	3,600	2,670	2,670	6,010	11,700	2,670	1,460	3,430
24	2,670	16,500	17,500	18,100	3,430	2,400	2,670	2,810	9,440	2,140	1,460	9,440
25	2,670	19,400	17,800	13,000	3,270	2,810	2,400	3,110	5,550	1,900	1,360	7,540
26	2,530	14,900	11,700	8,880	3,270	4,710	3,430	3,430	4,130	1,780	1,360	5,120
27	2,530	13,300	8,880	7,280	3,110	6,760	2,670	2,810	2,810	1,780	1,360	4,510
28	3,950	9,440	7,800	9,720	3,110	5,330	2,270	2,670	2,140	1,560	1,360	4,130
29	46,000	7,540	29,600	14,300	3,110	4,510	2,140	2,140	2,810	1,560	1,460	3,770
30	39,900	......	28,000	11,700	3,430	3,770	1,900	1,900	2,270	1,460	1,460	3,430
31	20,700	......	21,300	......	3,600	......	1,780	1,780	......	1,560	......	3,430

NOTE.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Tallapoosa River at Sturdevant, Ala., for 1912.

[Drainage area, 2,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	46,000	2,530	8,040	3.22	3.71
February	19,400	3,430	8,310	3.32	3.58
March	54,400	5,550	13,900	5.56	6.41
April	30,600	5,120	11,800	4.72	5.27
May	12,700	3,110	5,630	2.25	2.59
June	31,900	2,400	5,740	2.30	2.57
July	10,300	1,780	4,350	1.74	2.01
August	10,800	1,780	4,030	1.61	1.86
September	11,700	1,180	2,480	.992	1.11
October	8,880	1,460	2,530	1.01	1.16
November	1,670	1,270	1,440	.576	.64
December	9,440	1,460	3,400	1.36	1.57
The year	54,400	1,180	5,960	2.38	32.48

TOMBIGBEE RIVER AT COLUMBUS, MISS.

Location.—At the county highway bridge at Columbus, Miss., 2 miles above the mouth of Luxapallila Creek and about 6 miles below the mouth of Tibbee River.

Records available.—July 13, 1905, to December 31, 1912. Also for 1900 to 1904, using the gage heights furnished by the United States Weather Bureau, some of which, especially for low stages, were very greatly in error.

Drainage area.—4,440 square miles.

Gage.—Chain gage was installed by the United States Geological Survey on July 13, 1905, at the highway bridge 1,000 feet above the original site of the gage of the United States Weather Bureau. The new gage was set to read the same as the first United States Weather Bureau gage at low water, which makes it practically on the same datum, as the low-water surface is almost level.

Channel.—The right bank is high and seldom overflows. The left bank overflows only under the bridge approach at a gage height of about 20 feet. The bed of the stream is of soft limestone or chalk and conditions of flow are somewhat changeable at low stages.

Discharge measurements.—Made from the wagon bridge.

Accuracy.—Estimates may be somewhat in error at low stages, due to changes at controlling section.

The following discharge measurement was made by W. E. Hall:

April 8, 1912, gage height, 17.78 feet; discharge, 24,500 second-feet.

Daily gage height, in feet, of Tombigbee River at Columbus, Miss., for 1912.

[C. R. Shackelford, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	19.0	13.8	15.8	22.8	18.1	−0.8	5.1	−2.0	−2.1	−0.5	−2.4	−2.5
2	19.1	14.9	14.6	25.4	19.9	− .9	8.3	−2.1	−2.4	−1.0	−2.5	−2.4
3	19.4	14.8	11.4	26.5	21.5	− .8	8.9	−2.2	−2.5	−1.4	−2.5	− .2
4	20.4	12.0	9.3	27.0	21.3	− .5	8.2	−2.2	−2.6	−1.8	−2.5	3.2
5	20.9	8.5	8.5	26.2	19.4	− .2	7.1	−1.7	−2.7	−2.2	−2.0	6.5
6	20.5	6.0	11.1	24.2	16.2	.1	5.4	−1.7	−2.8	−2.3	−2.0	11.4
7	18.9	4.3	11.2	21.6	14.3	.0	4.7	−2.2	−2.9	−2.4	−2.1	13.2
8	16.1	3.0	11.6	18.9	14.4	− .5	3.4	−1.8	−3.0	−2.7	−2.1	13.7
9	14.9	2.2	13.7	16.3	13.9	− .8	3.3	−1.8	−3.0	−2.8	−2.0	14.8
10	13.6	2.1	14.0	14.4	13.8	−1.1	4.5	.9	−3.0	−2.9	−1.9	15.5

Daily gage height, in feet, of Tombigbee River at Columbus, Miss., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	12.3	2.1	14.1	12.9	13.4	−1.4	4.5	2.0	−3.1	−2.9	−1.9	14.7
12	11.8	2.2	15.7	11.4	12.3	−1.7	3.7	1.8	−3.1	−2.9	−2.1	13.0
13	11.0	2.2	17.4	10.3	10.1	−1.9	3.7	1.3	−3.1	−3.0	−2.3	11.0
14	9.5	2.3	17.2	11.4	8.3	−2.0	3.1	1.8	−3.2	−3.1	−2.4	9.3
15	7.7	2.4	18.5	11.1	7.1	−2.0	1.8	1.8	−3.0	−3.1	−2.3	7.8
16	5.8	2.4	19.7	14.8	6.0	−2.0	1.0	1.3	−1.0	−3.2	−2.3	5.4
17	4.5	2.2	19.5	20.7	4.8	−1.6	.4	.4	.1	−3.2	−2.1	3.0
18	3.4	2.0	19.3	23.8	4.0	−1.0	1.8	.9	1.3	−3.0	−2.3	2.2
19	7.2	1.7	19.0	26.1	2.8	−1.5	4.4	.0	.9	−2.7	−2.4	2.6
20	10.1	1.3	17.9	26.7	1.8	−1.9	5.0	− .7	.6	3.2	−2.5	2.7
21	10.7	4.7	15.5	26.2	1.2	−2.0	5.0	− .8	.5	3.4	−2.5	2.4
22	11.1	7.8	12.6	25.1	.8	−2.0	4.1	−1.3	.7	2.7	−2.5	1.5
23	11.2	8.4	10.4	25.1	.4	−2.2	2.8	−1.3	1.0	1.3	−2.6	2.2
24	9.4	9.2	11.2	24.3	.1	−2.1	1.2	1.2	1.2	1.7	−2.6	6.9
25	6.5	11.0	12.5	22.4	− .1	−2.0	.0	1.7	.5	1.0	−2.6	8.8
26	4.5	13.0	13.3	20.2	− .4	− .8	− .6	1.3	− .4	.2	− 2.6	9.3
27	3.5	13.8	14.8	16.8	− .4	.8	− .9	.0	−1.3	− .6	−2.6	10.0
28	2.9	14.6	16.8	16.0	.0	2.7	−1.4	− .5	−1.8	−1.3	−2.6	9.9
29	8.5	15.5	19.4	16.0	.3	2.9	−1.6	−1.0	− .3	−1.7	−2.6	8.4
30	12.4	......	20.8	16.6	− .4	2.8	−1.7	−1.5	− .2	−2.0	−2.5	7.7
31	12.8	......	21.1	......	− .7	......	−1.8	−1.8	......	−2.2	......	8.3

Daily discharge, in second-feet, of Tombigbee River at Columbus, Miss., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	28,900	19,700	23,000	38,000	27,100	1,940	7,720	1,130	1,070	2,170	895	840
2	29,100	21,500	21,000	44,500	30,900	1,870	11,700	1,070	895	1,800	840	895
3	29,700	21,300	16,000	47,200	34,800	1,940	12,500	1,010	840	1,520	840	2,410
4	32,100	16,900	13,000	48,500	34,200	2,170	11,600	1,010	785	1,260	840	5,620
5	33,300	12,000	12,000	46,500	29,700	2,410	10,100	1,320	735	1,010	1,130	9,400
6	32,300	8,800	15,600	41,500	23,700	2,670	8,080	1,320	685	950	1,130	16,000
7	28,700	6,810	15,700	35,000	20,500	2,580	7,250	1,010	635	895	1,070	18,800
8	23,500	5,420	16,300	28,700	20,700	2,170	5,820	1,260	590	735	1,070	19,600
9	21,500	4,620	19,600	23,900	19,900	1,940	5,720	1,260	590	685	1,130	21,300
10	19,400	4,520	20,100	20,700	19,700	1,730	7,030	3,390	590	635	1,200	22,500
11	17,400	4,520	20,200	18,300	19,100	1,520	7,030	4,420	545	635	1,200	21,200
12	16,600	4,620	22,800	16,000	17,400	1,320	6,150	4,230	545	635	1,070	18,500
13	15,400	4,620	25,800	14,400	14,100	1,200	6,150	3,760	545	590	950	15,400
14	13,300	4,720	25,500	16,000	11,700	1,130	5,520	4,230	500	545	895	13,000
15	10,900	4,820	27,900	15,600	10,100	1,130	4,230	4,230	590	545	950	11,000
16	8,560	4,820	30,400	21,300	8,800	1,130	3,480	3,760	1,800	500	950	8,080
17	7,030	4,620	30,000	32,800	7,360	1,390	2,940	2,940	2,670	500	1,070	5,420
18	5,820	4,420	29,500	40,500	6,480	1,800	4,230	3,390	3,760	590	950	4,620
19	10,300	4,140	28,900	46,200	5,220	1,460	6,920	2,580	3,390	735	895	5,020
20	14,100	3,760	26,700	47,800	4,230	1,200	7,600	2,020	3,120	5,620	840	5,120
21	15,000	7,250	22,500	46,500	3,660	1,130	7,600	1,940	3,030	5,820	840	4,820
22	15,600	11,000	17,800	43,800	3,300	1,130	6,590	1,590	3,210	5,120	840	3,940
23	15,700	11,800	14,600	43,800	2,940	1,010	5,220	1,590	3,480	3,760	785	4,620
24	13,200	12,900	15,700	41,800	2,670	1,070	3,660	3,660	3,660	4,140	785	9,880
25	9,400	15,400	17,700	37,000	2,500	1,130	2,580	4,140	3,030	3,480	785	12,300
26	7,030	18,500	18,900	31,600	2,250	1,940	2,090	3,760	2,250	2,760	785	13,000
27	5,930	19,700	21,300	24,700	2,250	3,300	1,870	2,580	1,590	2,090	785	14,000
28	5,320	21,000	24,700	23,400	2,580	5,120	1,520	2,170	1,260	1,590	785	13,900
29	12,000	22,500	29,700	23,400	2,850	5,320	1,390	1,800	2,330	1,320	785	11,800
30	17,500	......	33,000	24,400	2,250	5,220	1,320	1,460	2,410	1,130	840	10,900
31	18,100	......	33,800	......	2,020	......	1,260	1,260	......	1,010	......	11,700

Note.—Daily discharge computed from a rating curve well defined below 4,000 second-feet and fairly well defined below 32,000 second-feet.

Monthly discharge of Tombigbee River at Columbus, Miss., for 1912.

[Drainage area, 4,440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	33,300	5,320	17,200	3.87	4.46	B.
February	22,500	3,760	10,600	2.39	2.58	B.
March	33,800	12,000	25,500	5.74	6.62	B.
April	48,500	14,400	32,800	7.39	8.24	C.
May	34,800	2,020	12,700	2.86	3.30	B.
June	5,320	1,010	2,040	.459	.51	A.
July	12,500	1,260	5,710	1.29	1.49	B.
August	4,420	1,010	2,430	.547	.63	A.
September	3,760	500	1,700	.383	.43	A.
October	5,820	500	1,770	.399	.46	A.
November	1,200	785	931	.210	.23	A.
December	22,500	840	10,800	2.43	2.80	B.
The year	48,500	500	10,400	2.34	31.75	

TOMBIGBEE RIVER AT EPES, ALA.

Location.—At the Alabama Great Southern Railroad bridge just below the mouth of Jones Creek, about half a mile from Epes, Ala.

Records available.—1900 and 1901 (discharge measurements were made by the United States Geological Survey and a rating was developed for these years); November 29, 1904, to December 31, 1912. A record of approximate gage heights, based on a gage painted on one of the bridge piers, has been kept by the Alabama Great Southern Railroad for a number of years.

Drainage area.—8,830 square miles.

Gage.—Standard chain gage attached to the railroad bridge; datum unchanged.

Channel.—At flood stages—gage heights of 38 feet and over—the left bank overflows for about seven-eighths of a mile under the trestle approach to the bridge. Some changes in section have probably occurred since the station was established.

Discharge measurements.—Made from the downstream side of the railroad bridge. No discharge measurements were made at this station during 1912.

Accuracy.—Good results have been obtained at this station in the years when sufficient discharge measurements were made to fix the rating curve.

Daily gage height, in feet, of Tombigbee River at Epes, Ala., for 1912.

[George Haven, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	38.7	28.2	29.6	43.8	45.1	4.8	9.9	3.4	3.4	4.4	2.8	2.3
2	39.4	28.4	30.0	44.1	44.2	5.6	11.8	3.1	2.5	4.2	2.6	2.4
3	39.8	28.6	30.7	44.4	43.2	7.6	15.2	2.9	2.6	4.0	2.5	2.9
4	40.0	28.9	31.2	44.7	42.4	7.0	16.7	2.8	2.7	3.8	2.4	6.7
5	40.1	28.8	29.8	45.2	41.7	6.8	16.4	2.7	2.6	3.7	2.4	12.6
6	39.8	27.4	28.1	45.6	41.8	6.4	15.8	2.8	2.4	3.4	2.5	17.1
7	39.8	23.8	26.6	46.0	41.8	7.2	14.7	3.4	2.4	3.1	2.8	19.6
8	39.6	18.4	26.8	46.4	41.8	7.7	13.1	3.0	2.0	2.8	2.8	22.1
9	39.9	13.8	28.6	46.5	41.4	6.0	11.3	2.9	2.0	2.4	2.9	23.2
10	39.8	12.2	29.2	46.4	40.4	5.1	10.4	3.6	1.8	2.2	3.0	23.9
11	39.4	12.4	29.4	45.9	39.2	4.6	11.3	8.0	1.8	2.1	3.2	24.4
12	38.4	11.6	32.6	45.1	37.4	4.0	11.6	10.8	1.7	2.0	3.2	25.2
13	36.6	10.8	33.8	44.1	35.6	4.5	10.7	10.6	1.7	2.2	3.0	24.8
14	34.5	11.8	34.5	42.6	33.8	8.6	9.9	9.4	1.7	2.3	3.0	23.8
15	31.7	13.3	37.8	41.2	30.8	8.0	9.4	8.7	2.4	1.8	2.8	21.2

Daily gage height, in feet, of Tombigbee River at Epes, Ala., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	27.2	12.4	38.8	42.1	26.2	5.2	8.3	8.9	2.6	1.8	2.7	18.0
17	22.8	11.5	39.6	44.2	20.2	4.3	7.3	8.2	2.5	1.8	2.8	14.5
18	17.6	10.9	40.0	45.2	15.1	4.2	7.3	7.2	5.2	1.8	2.7	11.0
19	15.6	10.2	40.2	46.2	11.9	4.3	9.0	6.7	6.4	2.0	2.7	9.0
20	17.5	9.6	40.4	47.5	10.0	4.1	12.5	6.0	6.0	2.1	2.6	8.6
21	20.0	12.8	40.4	48.4	8.8	3.6	13.4	5.0	5.4	5.7	2.5	8.4
22	20.9	18.4	40.2	49.1	7.8	3.3	12.4	4.4	5.4	7.6	2.4	8.2
23	21.0	21.0	40.3	49.5	7.2	3.1	11.5	4.0	5.6	7.6	2.4	9.0
24	21.0	22.6	41.2	49.2	6.7	3.0	9.5	4.4	5.8	6.8	2.3	14.2
25	24.0	25.0	40.6	48.8	6.2	2.9	7.6	5.8	5.8	6.5	2.3	17.0
26	18.0	26.8	40.2	48.3	5.8	3.0	6.4	6.6	6.0	6.2	2.3	18.7
27	14.0	28.4	39.1	47.8	5.5	3.6	5.4	6.4	5.4	5.6	2.2	19.4
28	11.9	29.2	39.0	47.2	5.3	5.0	5.0	5.9	4.6	5.0	2.2	19.6
29	22.6	29.4	41.0	46.7	5.4	7.0	4.6	5.0	3.8	4.2	2.3	19.4
30	25.9	....	43.0	46.0	5.6	9.1	4.0	4.4	3.4	3.5	2.3	19.0
31	27.6	....	43.5	....	5.2	....	3.6	3.9	....	3.0	....	18.8

Daily discharge, in second-feet, of Tombigbee River at Epes, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	39,100	28,100	29,600	44,400	45,700	4,130	9,120	2,860	2,860	3,760	2,330	1,920
2	39,800	28,400	30,000	44,700	44,800	4,890	11,100	2,590	2,080	3,580	2,160	2,000
3	40,200	28,600	30,700	45,000	43,700	6,800	14,600	2,420	2,160	3,400	2,080	2,420
4	40,400	28,900	31,300	45,300	42,900	6,220	16,200	2,330	2,240	3,220	2,000	5,940
5	40,500	28,800	29,800	45,800	42,200	6,030	15,900	2,240	2,160	3,130	2,000	11,900
6	40,200	27,300	28,000	46,200	42,300	5,650	15,300	2,330	2,000	2,860	2,080	16,600
7	40,200	23,600	26,500	46,700	42,300	6,410	14,100	2,860	2,000	2,590	2,330	17,200
8	40,000	18,000	26,700	47,100	42,300	6,900	12,400	2,500	1,680	2,330	2,330	21,800
9	40,300	13,200	28,600	47,200	41,900	5,270	10,600	2,420	1,680	2,000	2,420	22,900
10	40,200	11,500	29,200	47,100	40,800	4,420	9,640	3,040	1,530	1,840	2,500	23,700
11	39,800	11,700	29,400	46,600	39,600	3,940	10,600	7,200	1,530	1,760	2,680	24,200
12	38,800	10,900	32,700	45,700	37,700	3,400	10,900	10,100	1,460	1,680	2,680	25,000
13	36,900	10,100	34,000	44,700	35,800	3,850	9,950	9,840	1,460	1,840	2,500	24,600
14	34,700	11,100	34,700	43,100	34,000	7,800	9,120	8,600	1,460	1,920	2,500	23,600
15	31,800	12,700	38,100	41,700	30,900	7,200	8,600	7,900	2,000	1,530	2,330	20,900
16	27,100	11,700	39,200	42,600	26,100	4,510	7,500	8,100	2,160	1,530	2,240	17,500
17	22,500	10,800	40,000	44,800	19,800	3,670	6,500	7,400	2,080	1,530	2,330	13,900
18	17,100	10,200	40,400	45,800	14,500	3,580	6,500	6,410	4,510	1,530	2,240	10,300
19	15,000	9,430	40,600	46,900	11,200	3,670	8,200	5,940	5,650	1,680	2,240	8,200
20	17,000	8,800	40,800	48,200	9,220	3,490	11,800	5,270	5,270	1,760	2,160	7,800
21	19,600	12,100	40,800	49,200	8,000	3,040	12,800	4,320	4,700	4,980	2,080	7,600
22	20,600	18,000	40,600	49,900	7,000	2,770	11,700	3,760	4,700	6,800	2,000	7,400
23	20,700	20,700	40,700	50,300	6,410	2,590	10,800	3,400	4,890	6,800	2,000	8,200
24	20,700	22,300	41,700	50,000	5,940	2,500	8,700	3,760	5,080	6,030	1,920	13,600
25	23,800	24,800	41,000	49,600	5,460	2,420	6,800	5,080	5,080	5,740	1,920	16,500
26	17,500	26,700	40,600	49,100	5,080	2,500	5,650	5,840	5,270	5,460	1,920	18,300
27	13,400	28,400	39,500	48,500	4,800	3,040	4,700	5,650	4,700	4,890	1,840	17,000
28	11,200	29,200	39,400	47,900	4,600	4,320	4,320	5,180	3,940	4,320	1,840	17,200
29	22,300	29,400	41,500	47,400	4,700	6,220	3,940	4,320	3,220	3,580	1,920	17,000
30	25,800	....	43,500	46,700	4,890	8,300	3,400	3,760	2,860	2,950	1,920	18,600
31	27,500	....	44,100	....	4,510	....	3,040	3,310	....	2,500	....	18,400

NOTE.—Daily discharge computed from a rating curve fairly well defined below 16,000 second-feet.

Monthly discharge of Tombigbee River at Epes, Ala., for 1912.

[Drainage area, 8,830 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	40,500	11,200	29,200	3.31	3.82
February	29,400	8,800	19,200	2.17	2.34
March	44,100	26,500	35,900	4.07	4.69
April	50,300	41,700	46,600	5.28	5.89
May	45,700	4,510	24,200	2.74	3.16
June	8,300	2,420	4,650	.527	.59
July	16,200	3,040	9,500	1.08	1.24
August	10,100	2,240	4,860	.550	.63
September	5,650	1,460	3,080	.349	.39
October	6,800	1,530	3,210	.364	.42
November	2,680	1,840	2,180	.247	.28
December	25,000	1,920	14,900	1.69	1.95
The year	50,300	1,460	16,500	1.87	25.40

BLACK WARRIOR RIVER NEAR CORDOVA, ALA.

Location.—At the Kansas City, Memphis & Birmingham Railroad bridge 1 mile east of Cordova and just below the mouth of Cane Creek; 12 miles below junction of Mulberry and Sipsey forks and 6 miles below the mouth of Blackwater Creek.

Records available.—May 21, 1900, to December 31, 1912.

Drainage area.—1,900 square miles.

Gage.—Staff gage in three sections, the lower one being a sloping timber bolted to bed rock, graduated from —0.6 to 10.0 feet; the other two sections are vertical timbers. All the sections are on the right bank near the railroad bridge. The datum of the gage has not been changed, but several gages at slightly different sites have been used.

Channel.—The bed is rocky with a fair current except at low stages; at high stages the left bank overflows under the bridge.

Discharge measurements.—Made from the railroad bridge. Some of the low-water measurements have been made by wading or from a boat at other sections near by. No discharge measurements were made at this station during 1912.

Accuracy.—The minimum flow is especially low per square mile of drainage area, and the rating at this stage is subject to considerable change.

Cooperation.—Gage heights furnished by the United States Engineer Corps.

Daily gage height, in feet, of Black Warrior River near Cordova, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.0	9.5	6.5	19.6	9.0	—0.3	1.5	0.0	0.0	0.0	0.0	0.0
2	13.0	6.5	5.0	18.7	6.0	— .2	1.5	.0	.0	.0	.0	.0
3	8.7	5.1	4.5	13.0	5.0	— .8	1.0	.0	.0	.0	.0	.0
4	7.3	4.2	5.5	9.5	4.6	— .4	.8	.0	.0	.0	.0	.3
5	3.1	3.5	5.0	7.2	3.5	— .8	.0	.0	.0	.0	.0	1.0
6	4.7	2.8	8.0	5.7	3.0	— .4	.0	.0	.0	.0	.0	5.5
7	3.8	2.7	8.5	5.0	5.0	.0	6.0	.0	.0	.0	.8	4.5
8	3.7	2.0	7.0	5.5	5.5	— .3	4.5	.0	.0	.0	.7	3.6
9	13.5	2.0	9.0	4.5	4.5	— .4	4.4	2.0	.0	.0	.7	2.6
10	13.8	2.0	9.8	4.0	3.5	— .8	4.5	2.8	.0	.0	.6	2.0
11	8.5	1.8	8.0	4.7	3.0	.0	3.6	4.0	.0	.0	.4	1.0
12	6.5	1.6	7.5	4.5	2.5	.0	2.0	2.0	.0	.0	.4	1.2
13	5.2	1.6	7.4	4.5	3.5	.0	2.0	1.0	.0	.0	.4	1.2
14	4.2	1.7	6.1	4.0	2.0	.0	1.5	3.0	.0	.0	.4	1.0
15	3.6	5.0	12.0	3.5	1.5	5.0	1.0	1.0	.0	.0	.4	1.0

Daily gage height, in feet, of Black Warrior River near Cordova, Ala., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	3.2	5.6	24.0	9.0	1.5	2.0	1.0	.5	.0	.0	.0	1.0
17	2.6	4.9	16.0	24.0	1.5	1.0	.5	1.0	.0	.0	.0	1.0
18	1.5	4.3	10.0	28.0	1.5	.8	2.0	1.0	.0	.0	.0	1.3
19	2.3	3.6	7.0	18.0	.0	.0	2.8	.5	− .5	.0	.0	1.3
20	4.5	3.6	5.7	10.6	− .2	.0	3.0	.0	− .3	.8	.0	1.0
21	3.7	9.6	5.0	8.0	.6	.0	3.0	.0	.0	.7	.0	1.0
22	3.0	16.6	4.0	7.0	.7	.0	2.0	.0	− .3	.6	.0	1.0
23	2.4	11.3	4.0	23.0	.0	.0	1.0	.5	.0	.5	.0	1.7
24	2.3	7.5	11.0	24.0	.0	.0	.5	.6	.0	.4	.0	3.4
25	2.7	8.7	18.0	8.5	.0	.0	.0	1.0	.0	.3	.0	3.5
26	2.0	19.0	11.0	6.2	.0	.0	.0	.5	.0	.0	.0	2.3
27	1.7	19.5	8.0	5.0	.0	.0	.0	.6	.0	.0	.0	2.8
28	1.5	13.0	6.0	13.5	.0	.0	.0	.7	.0	.0	.0	2.4
29	11.0	8.7	22.0	13.5	.0	3.0	.0	.3	.0	.0	.0	2.0
30	19.3	....	27.0	10.0	.0	1.0	.0	.0	.0	.0	.0	2.8
31	13.0	....	19.0	....	− .6	....	.0	.0	....	.0	....	6.0

Daily discharge, in second-feet, of Black Warrior River near Cordova, Ala., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	25,200	12,400	8,130	27,600	11,600	415	1,850	605	605	605	605	605
2	17,600	8,130	6,080	26,200	7,430	475	1,850	605	605	605	605	605
3	11,200	6,210	5,430	17,600	6,080	165	1,360	605	605	605	605	605
4	9,250	5,040	6,730	12,400	5,560	355	1,190	605	605	605	605	810
5	3,640	4,130	6,080	9,110	4,130	165	605	605	605	605	605	1,360
6	5,690	3,290	10,200	7,010	3,520	355	605	605	605	605	605	6,730
7	4,520	3,180	10,900	6,080	6,080	605	7,430	605	605	605	1,190	5,430
8	4,390	2,380	8,830	6,730	6,730	415	5,430	605	605	605	1,110	4,260
9	18,400	2,380	11,600	5,430	5,430	355	5,300	2,380	605	605	1,110	3,060
10	18,800	2,380	12,800	4,780	4,130	165	5,430	3,290	605	605	1,030	2,380
11	10,900	2,160	10,200	5,690	3,520	605	4,260	4,780	605	605	880	1,360
12	8,130	1,960	9,530	5,430	2,940	605	2,380	2,380	605	605	880	1,560
13	6,340	1,960	9,390	5,430	4,130	605	2,380	1,360	605	605	880	1,560
14	5,040	2,060	7,570	4,780	2,380	605	1,850	3,520	605	605	880	1,360
15	4,260	6,080	16,200	4,130	1,850	6,080	1,360	1,360	605	605	880	1,360
16	3,760	6,870	34,200	11,600	1,850	2,380	1,360	955	605	605	605	1,360
17	3,060	5,950	22,200	34,200	1,850	1,360	955	1,360	605	605	605	1,360
18	1,850	5,170	13,200	40,200	1,850	1,190	2,380	1,360	605	605	605	1,650
19	2,720	4,260	8,830	25,200	605	605	3,290	955	300	605	605	1,650
20	5,430	4,260	7,010	14,000	475	605	3,520	605	415	1,190	605	1,360
21	4,390	12,600	6,080	10,200	1,030	605	3,520	605	605	1,110	605	1,360
22	3,520	23,000	4,780	8,830	1,110	605	2,380	605	415	1,030	605	1,360
23	2,830	15,100	4,780	32,600	605	605	1,360	955	605	955	605	2,060
24	2,720	9,530	14,700	34,200	605	605	955	1,030	605	880	605	4,000
25	3,180	11,200	25,200	10,900	605	605	605	1,360	605	810	605	4,130
26	2,380	26,600	14,600	7,710	605	605	605	955	605	605	605	2,720
27	2,060	27,400	10,200	6,080	605	605	605	1,030	605	605	605	3,290
28	1,850	17,600	7,430	18,400	605	605	605	1,110	605	605	605	2,830
29	14,600	11,200	31,200	18,400	605	3,520	605	810	605	605	605	2,380
30	27,100	....	38,600	13,200	605	1,360	605	605	605	605	605	3,290
31	17,600	....	26,600	....	250	....	605	605	....	605	....	7,430

NOTE.—Daily discharge computed from a rating curve fairly well defined between 1,400 and 19,000 second-feet. Low-water estimates below 1,000 second-feet are very uncertain.

Monthly discharge of Black Warrior River near Cordova, Ala., for 1912.

[Drainage area, 1,900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	27,100	1,850	8,140	4.28	4.93
February	27,400	1,960	8,430	4.44	4.79
March	38,600	4,780	13,200	6.95	8.01
April	40,200	4,130	14,500	7.63	8.51
May	11,600	250	2,880	1.52	1.75
June	6,080	165	928	.488	.54
July	7,430	605	2,170	1.14	1.31
August	4,780	605	1,250	.658	.76
September	605	300	582	.306	.34
October	1,190	605	681	.358	.41
November	1,190	605	718	.378	.42
December	7,430	605	2,430	1.28	1.48
The year	40,200	165	4,640	2.44	33.25

PEARL RIVER BASIN.

PEARL RIVER AT JACKSON, MISS.

Location.—At the county highway bridge at Jackson, one-eighth mile above the Alabama & Vicksburg Railway bridge, about 5 miles above the mouth of Richland Creek.

Records available.—June 24, 1901, to December 31, 1912.

Drainage area.—3,120 square miles.

Gage.—Standard chain gage attached to the highway bridge; datum unchanged.

Channel.—The channel is somewhat obstructed by old piles. The right bank is high and does not overflow. The left bank is of clear ground and overflows for several hundred feet at a stage of about 20 feet.

Discharge measurements.—Made from the highway bridge. No discharge measurements were made at this station during 1912.

Artificial control.—The flow is subject to little or no artificial control above or near the station.

Accuracy.—Some slight changes in the controlling section may affect the accuracy of low-water estimates.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Daily gage height, in feet, of Pearl River at Jackson, Miss., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	19.5	13.5	14.9	27.4	25.6	9.4	3.6	7.4	4.4	3.2	1.6	1.1
2	20.0	13.1	15.0	27.5	24.5	8.0	3.5	5.7	4.2	3.1	1.4	1.2
3	20.4	12.6	15.0	27.6	23.5	7.3	3.8	4.9	3.8	2.9	1.4	1.3
4	20.6	12.1	14.8	27.9	22.0	6.2	4.2	4.5	3.3	2.7	1.2	2.1
5	20.7	12.4	14.5	28.2	20.3	6.2	4.8	4.2	3.0	2.5	1.2	3.3
6	20.5	12.2	14.2	28.2	19.3	6.2	5.4	4.4	2.6	2.3	1.2	7.4
7	20.4	12.3	13.9	28.1	18.1	6.1	5.9	4.6	2.4	2.1	1.2	7.1
8	20.6	11.9	13.9	27.9	16.8	6.3	7.3	4.4	2.2	1.9	1.2	8.5
9	20.7	11.0	15.6	27.4	15.8	6.6	7.9	3.6	2.0	1.7	1.2	9.2
10	20.5	11.2	16.5	26.7	15.0	7.0	9.7	3.4	1.9	1.6	1.2	9.8
11	20.2	11.0	16.9	26.2	14.4	7.2	10.1	5.6	1.7	1.5	1.2	10.0
12	19.7	11.0	19.2	25.4	13.8	6.8	11.0	8.5	1.6	1.4	1.2	11.1
13	18.0	11.0	20.8	25.4	13.8	6.3	11.4	8.8	1.6	1.3	1.3	11.7
14	17.3	10.6	21.5	25.0	14.1	5.7	11.4	9.5	1.5	1.1	1.3	12.1
15	16.0	10.5	23.1	24.3	14.1	5.0	10.7	9.5	1.4	1.1	1.3	12.5

Daily gage height, in feet, of Pearl River at Jackson, Miss, for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	14.7	10.1	24.0	26.1	14.0	5.6	9.4	9.7	1.3	1.1	1.2	12.7
17	13.5	10.2	24.4	27.1	13.5	4.5	7.9	9.8	1.3	1.1	1.2	12.7
18	12.3	10.2	24.7	28.0	12.9	3.8	7.1	10.1	1.3	1.1	1.2	12.6
19	11.7	9.9	24.8	28.7	12.9	3.8	9.2	10.1	1.2	1.1	1.2	11.9
20	12.7	9.5	24.8	29.3	10.9	3.8	12.2	9.8	2.3	1.3	1.3	10.8
21	11.9	11.7	24.8	30.1	9.7	3.7	14.4	9.0	2.7	1.3	1.3	9.7
22	11.4	13.3	24.7	31.0	8.6	3.4	16.3	8.2	2.9	1.4	1.3	9.7
23	11.2	13.5	25.1	31.7	7.5	3.1	18.0	7.5	3.3	2.1	1.2	11.6
24	11.2	13.5	26.0	31.5	6.5	2.9	19.0	6.6	3.2	2.5	1.2	15.6
25	11.0	13.4	26.1	31.0	5.6	2.7	19.7	5.7	3.3	2.7	1.1	16.0
26	10.9	14.1	26.1	30.1	4.9	2.5	19.9	4.8	3.8	2.5	1.1	16.1
27	10.5	14.9	26.0	29.2	4.5	2.3	19.5	5.0	3.8	2.4	1.1	16.5
28	9.9	15.0	25.6	28.2	4.0	2.6	18.8	4.3	3.5	2.3	1.1	16.7
29	10.4	14.9	26.7	27.3	4.5	3.5	16.3	3.4	3.3	2.1	1.2	16.3
30	13.6	......	26.9	26.5	6.4	2.6	13.1	3.5	3.2	2.0	1.1	16.2
31	13.6	......	27.1	......	8.7	......	9.6	4.2	......	1.8	......	17.0

Daily discharge, in second-feet, of Pearl River at Jackson, Miss., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11,600	6,950	7,930	21,500	18,400	4,280	1,140	3,080	1,500	955	350	220
2	12,000	6,670	8,000	21,600	16,800	3,440	1,090	2,140	1,400	910	290	240
3	12,400	6,320	8,000	21,800	15,600	3,020	1,220	1,720	1,220	830	290	265
4	12,500	6,000	7,860	22,400	13,900	2,420	1,400	1,540	1,000	750	240	520
5	12,600	6,200	7,650	23,000	12,300	2,420	1,680	1,400	870	670	240	1,000
6	12,400	6,060	7,440	23,000	11,400	2,420	1,980	1,500	710	590	240	3,080
7	12,400	6,130	7,230	22,800	10,400	2,360	2,260	1,580	630	520	240	2,920
8	12,500	5,870	7,230	22,400	9,340	2,480	3,020	1,500	555	450	240	3,740
9	12,600	5,280	8,420	21,500	8,560	2,640	3,380	1,140	485	380	240	4,160
10	12,400	5,420	9,100	20,200	8,000	2,860	4,460	1,040	450	350	240	4,520
11	12,200	5,280	9,420	19,300	7,580	2,970	4,700	2,090	380	320	240	4,640
12	11,700	5,280	11,300	18,100	7,160	2,750	5,280	3,740	350	290	240	5,350
13	10,300	5,280	12,700	18,100	7,160	2,480	5,540	3,920	350	265	265	5,740
14	9,740	5,020	13,400	17,500	7,370	2,140	5,540	4,340	320	220	265	6,000
15	8,700	4,960	15,100	16,600	7,370	1,770	5,090	4,340	290	220	265	6,260
16	7,790	4,700	16,200	19,200	7,300	2,090	4,280	4,460	265	220	240	6,390
17	6,950	4,760	16,700	20,900	6,950	1,540	3,380	4,520	265	220	240	6,390
18	6,130	4,760	17,100	22,600	6,530	1,220	2,920	4,700	265	220	240	6,320
19	5,740	4,580	17,200	23,900	6,530	1,220	4,160	4,700	240	220	240	5,870
20	6,390	4,340	17,200	25,100	5,220	1,220	6,060	4,520	590	265	265	5,160
21	5,870	5,740	17,200	26,600	4,460	1,180	7,580	4,040	750	265	265	4,460
22	5,540	6,810	17,100	28,300	3,800	1,040	8,940	3,560	830	290	265	4,460
23	5,420	6,950	17,600	29,600	3,140	910	10,300	3,140	1,000	520	240	5,680
24	5,420	6,950	19,000	29,200	2,580	830	11,100	2,640	955	670	240	8,420
25	5,280	6,880	19,200	28,300	2,090	750	11,700	2,140	1,000	750	220	8,700
26	5,220	7,370	19,200	26,600	1,720	670	11,900	1,680	1,220	670	220	8,780
27	4,960	7,930	19,000	24,900	1,540	590	11,600	1,770	1,220	630	220	9,100
28	4,580	8,000	18,400	23,000	1,320	710	10,900	1,450	1,090	590	220	9,260
29	4,900	7,930	20,200	21,300	1,540	1,090	8,940	1,040	1,000	520	240	8,940
30	7,020	......	20,500	19,800	2,530	710	6,670	1,090	955	485	220	8,860
31	7,020	......	20,900	......	3,860	......	4,400	1,400	......	415	......	9,500

NOTE.—Daily discharge computed from a fairly well defined rating curve.

Monthly discharge of Pearl River at Jackson, Miss., for 1912.

[Drainage area, 3,120 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	12,600	4,580	8,720	2.79	3.22
February	8,000	4,340	6,010	1.93	2.08
March	20,900	7,230	14,000	4.49	5.18
April	29,600	16,600	22,600	7.24	8.08
May	18,400	1,320	7,180	2.30	2.65
June	4,280	590	1,870	.599	.67
July	11,900	1,090	5,570	1.79	2.06
August	4,700	1,040	2,640	.846	.98
September	1,500	240	738	.237	.26
October	955	220	473	.152	.18
November	350	220	249	.080	.09
December	9,500	220	5,320	1.71	1.97
The year	29,600	220	6,280	2.01	27.42

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in south Atlantic coast and eastern Gulf of Mexico drainage basins during 1912:

Miscellaneous measurements in Apalachicola River drainage basin in 1912.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Jan. 26	Chattahoochee	Apalachicola	Franklin, Ga	4.4	3,020
Nov. 20	Chipola	do	Clarkesville, Fla	8.3	1,720

Miscellaneous measurements in Mobile River drainage basin in 1912.

Date.	Stream.	Tributary to—	Locality	Discharge.
				Sec.-ft.
June 29	Shoal Creek	Etowah River	Waleska, Ga	36
29	Reinhardt Creek	Shoal Creek	do	3

Miscellaneous measurements in south Atlantic coast and eastern Gulf of Mexico drainage basins in 1912.

Date.	Stream.	Locality.	Gage height.[a]	Discharge.
			Feet.	*Sec.-ft.*
Nov. 19	East flume of Dunlop Mills	South Richmond, Va	21.7	158
19	West flume of Dunlop Mills	do	22.6	171

[a] Total head. Effective head not determined.

SUMMARY OF DISCHARGE PER SQUARE MILE.

The following summary of discharge per square mile is given to allow ready comparison of relative rates of run-off from different areas in the south Atlantic coast and eastern Gulf of Mexico drainage basins. It shows in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage. But the most important fact worth noting is the almost entire lack of uniformity or agreement between any two stations. It indicates that the discharge of each stream is a law unto itself and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, of south Atlantic coast and eastern Gulf of Mexico drainage basins for 1912.

	Drainage area (square miles).	Jan.	Feb.	Mar.	Apr.	May.	June.
James River at Buchanan, Va	2,060	1.28	1.98	4.75	1.98	2.77	0.519
James River at Cartersville, Va	6,230	1.49	1.78	4.06	1.85	2.79	.634
Roanoke River at Roanoke, Va	388	.840	1.60	4.48	1.65	3.32	.814
Roanoke River at Old Gaston, N. C	8,350	.880	1.75	4.55	1.49	2.02	.722
Yadkin River near Salisbury, N. C	3,400	1.04	1.72	4.09	1.77	2.51	1.04
Tallulah River at Tallulah Falls, Ga	191	3.36	4.34	6.81	5.24	4.19	3.45
Broad River (of Georgia) near Carlton, Ga	762	1.22	2.66	5.55	2.02	1.48	3.86
Ocmulgee River near Jackson, Ga	1,400	1.77	2.75	4.99	3.21	1.94	3.21
Oconee River near Greensboro, Ga	1,100	1.59	2.95	4.25	2.62	1.59	3.18
Oconee River at Fraley's Ferry, near Milledgeville, Ga	2,840	1.50	2.38	3.59	2.77	1.43	2.63
Oconee River at Dublin, Ga	4,180	2.33	2.92	5.10	3.78	1.80	3.11
Chattahoochee River near Norcross, Ga	1,170	2.48	3.45	5.22	3.83	2.58	3.20
Chattahoochee River at West Point, Ga	3,300	2.51	3.33	5.55	3.97	2.01	3.45
Flint River near Woodbury, Ga	1,090	2.04	3.02	5.07	3.54	1.85	1.97
Flint River near Culloden, Ga	2,000	2.02	2.67	3.88	2.94	1.54	1.74
Flint River near Montezuma, Ga	2,700	2.03	2.50	3.46	2.91	2.10	1.92
Flint River at Albany, Ga	5,000	3.36	2.80	4.92	4.42	2.12	1.71
Pea River at Pera, Ala	1,180	3.44	3.42	4.66	4.66	1.89	1.01
Conecuh River at Beck, Ala	1,290	3.15	4.58	5.20	5.69	1.91	.723
Oostanaula River at Resaca, Ga	1,610	2.11	3.74	4.81	3.96	2.42	1.90
Coosa River at Riverside, Ala	7,060	2.32	4.02	5.42	4.87	2.32	1.81
Alabama River at Selma, Ala	15,400	2.88	4.24	5.77	6.15	2.81	1.72
Etowah River near Ball Ground, Ga	466	2.73	4.23	6.46	4.72	3.45	3.35
Etowah River near Rome, Ga	1,800	2.02	3.75	5.37	3.60	2.68	2.57
Amicalola River near Potts Mountain, Ga	80	3.76	4.90	11.1	7.06	4.58	3.72
Talapoosa River at Sturdevant, Ala	2,500	3.22	3.32	5.56	4.72	2.25	2.30
Tombigbee River at Columbus, Miss	4,440	3.87	2.39	5.74	7.39	2.86	.459
Tombigbee River at Epes, Ala	8,830	3.31	2.17	4.07	5.28	2.74	.527
Black Warrior River near Cordova, Ala	1,900	4.28	4.44	6.95	7.63	1.52	.488
Pearl River at Jackson, Miss	3,120	2.79	1.93	4.49	7.24	2.30	.599

Summary of discharge, in second-feet per square mile, of south Atlantic coast and eastern Gulf of Mexico drainage basins for 1912—Continued.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
James River at Buchanan, Va.	0.539	0.207	0.269	0.217	0.500	0.386	1.28
James River at Cartersville, Va.	.514	.239	.727	.334	.735	.457	1.30
Roanoke River at Roanoke, Va.	.912	.394	.686	.330	.487	.523	1.34
Roanoke River at Old Gaston, N. C.	.650	.284	.551	.327	.641	.434	1.19
Yadkin River near Salisbury, N. C.	1.23	.641	1.21	.656	.868	.685	1.46
Tallulah River at Tallulah Falls, Ga.	4.73	2.86	3.39	......	......	......	......
Broad River (of Georgia) near Carlton, Ga.	2.26	1.40	1.64	1.36	.967	.958	2.11
Ocmulgee River near Jackson, Ga.	2.01	1.04	.871	1.25	.971	1.04	2.09
Oconee River near Greensboro, Ga.	2.52	1.15	1.38	.955	.955	.877	2.00
Oconee River at Fraleys Ferry, near Milledgeville, Ga.	1.71	.923	.915	.813	.827	.856	1.69
Oconee River at Dublin, Ga.	1.99	.907	.907	.746	1.02	1.03	2.13
Chattahoochee River near Norcross, Ga.	2.65	1.70	1.47	1.68	1.26	1.32	2.56
Chattahoochee River at West Point, Ga.	2.13	1.31	.991	1.29	.909	1.22	2.38
Flint River near Woodbury, Ga.	1.37	.819	.628	.804	.632	.991	1.89
Flint River near Culloden, Ga.	1.23	1.07	.600	.725	.515	.910	1.65
Flint River near Montezuma, Ga.	1.62	1.22	.848	.967	.793	1.15	1.79
Flint River at Albany, Ga.	1.58	1.32	.916	1.30	1.25	1.38	2.26
Pea River at Pera, Ala.	.797	.975	.958	1.88	2.15	2.50	2.36
Conecuh River at Beck, Ala.	.783	.884	.640	1.62	2.10	2.46	2.47
Oostanaula River at Resaca, Ga.	1.70	1.30	.752	.652	.553	1.11	2.08
Coosa River at Riverside, Ala.	1.93	1.20	.741	.783	.524	1.05	2.24
Alabama River at Selma, Ala.	1.91	1.42	.955	1.01	.721	1.47	2.58
Etowah River near Ball Ground, Ga.	3.48	2.27	1.99	2.09	1.44	1.59	3.15
Etowah River near Rome, Ga.	2.51	1.69	1.33	1.31	.906	1.04	2.39
Amicalola River near Potts Mountain, Ga.	4.61	2.66	2.40	2.29	1.71	1.82	4.22
Tallapoosa River at Sturdevant, Ala.	1.74	1.61	.992	1.01	.576	1.36	2.38
Tombigbee River at Columbus, Miss.	1.29	.547	.383	.399	.210	2.43	2.34
Tombigbee River at Epes, Ala.	1.08	.550	.349	.364	.247	1.69	1.87
Black Warrior River near Cordova, Ala.	1.14	.658	.306	.358	.378	1.28	2.44
Pearl River at Jackson, Miss.	1.79	.846	.237	.152	.080	1.71	2.01

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DEPARTMENT OF THE INTERIOR
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GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 323

SURFACE WATER SUPPLY OF THE UNITED STATES

1912

PART III. OHIO RIVER BASIN

BY

A. H. HORTON, W. E. HALL
AND H. J. JACKSON

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SURFACE WATER SUPPLY OF OHIO RIVER BASIN, 1912.

By A. H. HORTON, W. E. HALL, and H. J. JACKSON.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of twelve reports presenting results of measurements of flow made on streams in the United States during the calendar year 1912.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394) which contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected, and of the second kind on page 13.

Measurements of stream flow have been made at about 2,000 points in the United States, and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1912 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular water-supply papers from time to time.

PUBLICATIONS.

A report has been prepared for each calendar year embodying the stream-flow data collected during that year. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119. Circulars are also available giving complete lists of the gaging stations maintained by the Survey to date, and a list of the reports relating to the water supply of the country.

Prior to 1902 gage heights and discharge measurements were published in water-supply papers or bulletins and estimates of monthly discharge in annual reports; since 1902 both classes of data have been published in water-supply papers and they are now being published in twelve parts, as shown in the following table:

Papers on surface water supply of the United States, 1912.

Part.[a]	No.	Title.
I	321	North Atlantic coast basins.
II	322	South Atlantic coast and eastern Gulf of Mexico basins.
III	323	Ohio River basin.
IV	324	St. Lawrence River basin.
V	325	Upper Mississippi River and Hudson Bay basins.
VI	326	Missouri River basin.
VII	327	Lower Mississippi River basin.
VIII	328	Western Gulf of Mexico basins.
IX	329	Colorado River basin.
X	330	Great Basin.
XI	331	Pacific coast basins in California.
XII	332	North Pacific coast basins.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

A list of reports containing stream-flow data is presented in the following table:

Stream-flow data in reports of the United States Geological Survey.

[A—Annual Report; B—Bulletin; WS—Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Description information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	....do	1903.
WS 124 to 135	....do	1904.
WS 165 to 178	....do	1905.
WS 201 to 214	....do	1906.
WS 241 to 252	....do	1907-8.
WS 261 to 272	....do	1909.
WS 281 to 292	....do	1910.
WS 301 to 312	....do	1911.
WS 321 to 332	....do	1912.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table on page 8 gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for any station in the area covered by Part I are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, and 321, which contain records for the New England streams from 1903 to 1912. The year covered by the report is indicated at the head of the column in which the paper is listed.

Numbers of water-supply papers containing results of stream measurements, 1899–1912.

	[a] 1899	[b] 1900	1901	1902	1903	1904
North Atlantic coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 82, 83	[g] 97, 98	[f] 126, 127
Ohio River basin	36	48, [h] 49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129
Hudson Bay and upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, 100	[j] 128, 130
Missouri River	[k] 36, 37	49, [l] 50	66, 75	84	99	130, [m] 131
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	[n] 37, 38	50	66, 75	85	100	133
Great Basin	38, [o] 39	51	66, 75	85	100	133, [p] 134
Pacific coast in California	38, [q] 39	51	66, 75	85	100	134
North Pacific coast	38	51	66, 75	85	100	135

	1905	1906	1907–8	1909	1910	1911	1912
North Atlantic coast (St. John River to York River)	[d] 165, [e] 166, [f] 167	[d] 201, [e] 202, [f] 203	241	261	281	301	321
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[f] 167, 168	[f] 203, 204	242	262	282	302	322
Ohio River basin	169	205	243	263	283	303	323
St. Lawrence River and Great Lakes	170	206	244	264	284	304	324
Hudson Bay and upper Mississippi River	171	207	245	265	285	305	325
Missouri River	172	208	246	266	286	306	326
Lower Mississippi River	[j] 169, 173	[j] 205, 209	247	267	287	307	327
Western Gulf of Mexico	174	210	248	268	288	308	328
Colorado River	175, [r] 177	211	249	269	289	309	329
Great Basin	176. [p] 177	212, [p] 213	250, [p] 251	270, [p] 271	290	310	330
Pacific coast in California	177	213	251	271	291	311	331
North Pacific coast	[s] 177, 178	214	252	272	292	312	332

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[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, part 4.

[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Estimates for 1900 in Twenty-second Annual Report, part 4.

[c] Wissahickon and Schuylkill rivers to James River.

[d] New England rivers only.

[e] Hudson River to Delaware River, inclusive.

[f] Susquehanna River to Yadkin River, inclusive.

[g] James River only.

[h] Scioto River.

[i] Lake Ontario and tributaries to St. Lawrence River proper.

[j] Tributaries of Mississippi from east.

[k] Gallatin River.

[l] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[m] Platte and Kansas rivers.

[n] Green and Gunnison rivers and Grand River above junction with Gunnison.

[o] Mohave River only.

[p] Great Basin in California, excepting Truckee and Carson drainage basins.

[q] Kings and Kern rivers and south Pacific coast drainage basins.

[r] Below junction with Gila.

[s] Rogue, Umpqua, and Siletz rivers only.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Newport, Ky., Federal Building.
St. Paul, Minn., Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 302 Chamber of Commerce Building.
Salt Lake City, Utah, Brooks Arcade.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
San Francisco, Cal., 505 Customhouse.
Santa Fe, N. Mex., Capitol Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications will be sent on application to the Director of the United States Geological Survey, Washington, D. C.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches, and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off in depth in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot a second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Second-feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	0.03719	1.041	1.079	1.116	1.153
2.........	.07438	2.083	2.157	2.231	2.306
3.........	.11157	3.124	3.236	3.347	3.459
4.........	.14876	4.165	4.314	4.463	4.612
5.........	.18595	5.207	5.393	5.578	5.764
6.........	.22314	6.248	6.471	6.694	6.917
7.........	.26033	7.289	7.550	7.810	8.070
8.........	.29752	8.331	8.628	8.926	9.223
9.........	.33471	9.372	9.707	10.041	10.376

Note.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	1.983	55.54	57.52	59.50	61.49
2.........	3.967	111.1	115.0	119.0	123.0
3.........	5.950	166.6	172.6	178.5	184.5
4.........	7.934	222.1	230.1	238.0	246.0
5.........	9.917	277.7	287.6	297.5	307.4
6.........	11.90	333.2	345.1	357.0	368.9
7.........	13.88	388.8	402.6	416.5	430.4
8.........	15.87	444.3	460.2	476.0	491.9
9.........	17.85	499.8	517.7	535.5	553.4

Note.—For partial month multiply values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of March 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

100 Colorado miner's inches for one day equals 5.17 acre-feet.

100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1½ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharge and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge by plotting gage heights in feet as ordinates and discharge in second-feet as abscissas.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column at "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 9, are based.

The base data presented in this report, unless otherwise stated in description of station, have been collected by the methods commonly used at current-meter gaging stations and described in standard textbooks.

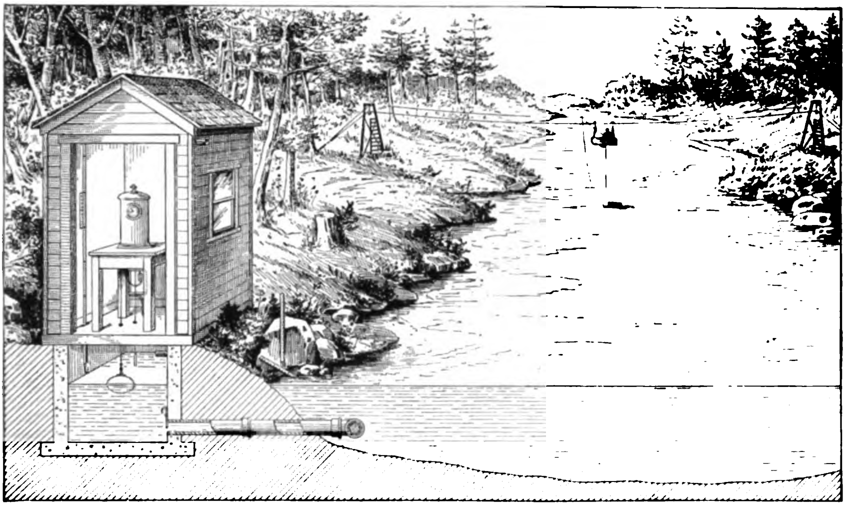
Plate I shows typical gaging stations. Plate II shows current meters used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

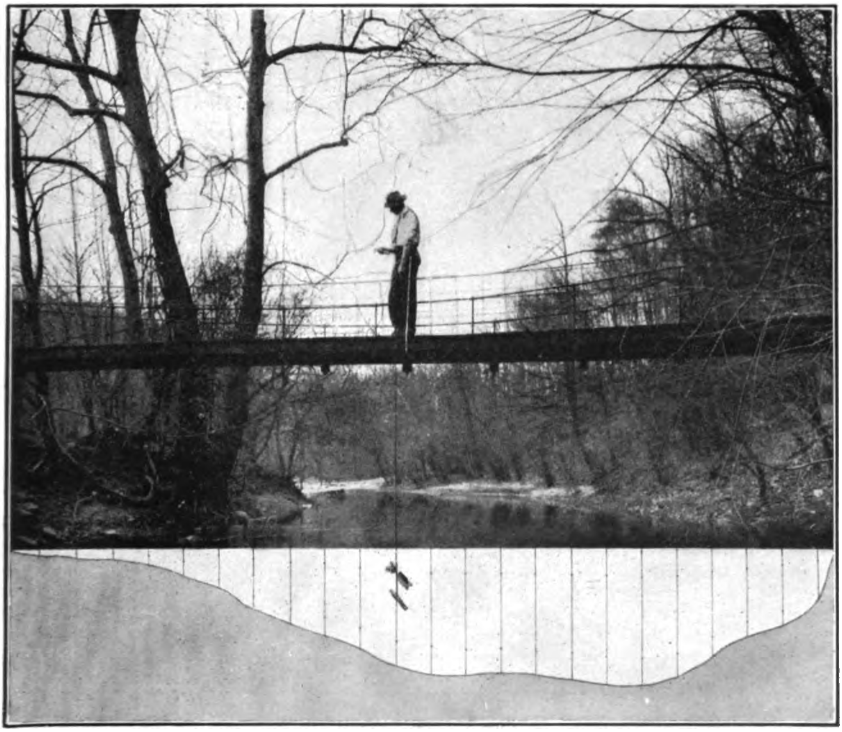
The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the

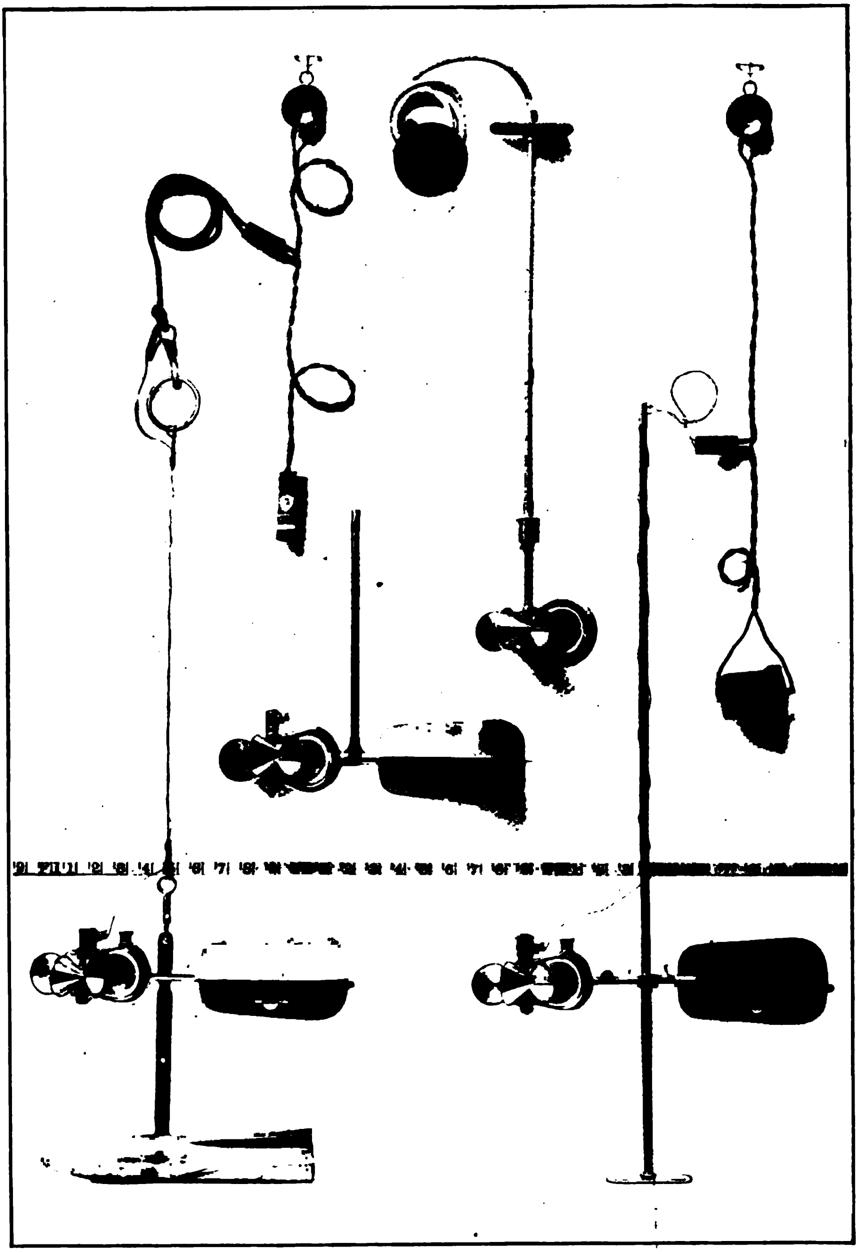


A. CABLE STATION WITH AUTOMATIC GAGE.



B. STATION FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



PRICE CURRENT METERS.

daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables, "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or ' approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the Survey engineers are published, not only to comply with the law, but also to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION.

The State of Illinois has paid for the stream gaging work in that State, the appropriation being in charge of the Rivers and Lakes Commission, Robert R. McCormick, chairman.

DIVISION OF WORK.

The field data for Allegheny River at Red House, N. Y., have been collected and the estimates prepared under the direction of C. C. Covert, district engineer, assisted by C. S. De Golyer and Frank Weber.

The field data for the Ohio River drainage basin, with the exception of Allegheny River at Red House, N. Y., and the Tennessee River drainage basin, have been collected under the direction of A. H. Horton, district engineer, assisted by C. T. Bailey, P. S. Monk, and L. S. Carr.

Stations in Pennsylvania are now maintained and the stream-flow data collected and furnished to the Survey by the Water Supply Commission of Pennsylvania.

The field data in the Tennessee River drainage basin have been collected by W. E. Hall, district engineer.

The ratings and studies of the completed data were made by A. H. Horton, W. E. Hall, and H. J. Jackson. The completed data were prepared for publication and the estimates of discharge during periods when the relation of gage height to discharge is believed to have been affected by ice (except for Allegheny River at Red House, N. Y.) were made by H. J. Jackson, assistant engineer. The computations were made by J. G. Mathers, H. D. Padgett, C. L. Batchelder, B. E. Jones, M. I. Walters, and G. A. Wallace.

The report was edited by Mrs. B. D. Wood.

STATION RECORDS.

ALLEGHENY RIVER BASIN.

ALLEGHENY RIVER AT RED HOUSE, N. Y.

Location.—At highway bridge at Red House, N. Y., on the road leading from the Pennsylvania Railroad station to the Erie Railroad station; about 5 miles below Salamanca and 13 miles above the State line between New York and Pennsylvania. Conewango Creek, the outlet of Chautauqua Lake, enters the Allegheny in the State of Pennsylvania.

Records available.—September 4, 1903, to December 31, 1912.

Drainage area—1,640 square miles.

Gage.—Standard chain, attached to the upstream side of bridge near left-hand end; datum unchanged.

Channel.—Practically permanent since establishment of station; broken by three bridge piers. Bed of stream, coarse gravel. Current good for medium and high stages; rather slow at low stages.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Ice affects the relation of gage height to discharge for periods during December, January, February, and March.

Artificial control.—Low-water flow may be slightly affected by the operation of several small power plants above Salamanca. At Olean, N. Y., a wasteway from Cuba reservoir enters the river through Olean Creek. This reservoir is on the divide between Oil Creek, tributary to Allegheny River, and Genesee River, tributary to Lake Ontario. The stored water is commonly turned into Genesee River through the abandoned summit level of Genesee River canal, but may be diverted into Oil Creek through a guard lock at the head of the canal.

Discharge measurements of Allegheny River at Red House, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 15	C. S. De Golyer	4.37	[a] 509
July 15	Frank Weber	3.30	542
Dec. 6	C. S. De Golyer	6.67	6,670
6	do	6.72	7,190

[a] Measurement made under complete ice cover.

Daily gage height, in feet, of Allegheny River at Red House, N. Y., for 1912.

[W. E. Coe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.4	......	4.25	10.4	7.2	3.7	2.90	3.15	4.60	4.70	4.40	4.45
2	5.5	......	4.35	11.0	6.7	3.65	2.90	3.25	5.00	5.00	4.50	4.80
3	5.4	......	4.60	10.6	6.2	3.85	2.95	3.50	6.60	5.80	4.40	6.90
4	5.4	......	4.6	9.9	5.4	3.55	2.90	3.30	6.20	5.40	4.40	6.85
5	5.5	......	4.8	9.3	5.0	3.55	2.90	3.20	5.80	5.00	4.35	5.80
6	4.9	......	4.8	9.5	4.9	3.55	2.95	3.20	5.60	4.00	4.45	6.70
7	4.9	......	5.0	9.0	4.8	3.40	3.00	3.10	5.00	3.90	5.20	6.20
8	4.9	......	5.0	8.6	4.7	3.35	3.00	3.30	4.80	3.95	5.80	6.20
9	4.9	......	5.0	8.7	4.6	3.30	3.15	3.10	4.50	3.90	5.80	5.60
10	4.9	......	4.9	8.1	4.5	3.25	3.10	3.05	4.10	3.80	5.50	5.10
11	4.9	......	5.0	7.9	4.5	3.20	3.25	3.05	4.60	4.10	5.50	5.20
12	4.9	......	5.0	7.5	4.6	3.20	3.30	3.05	5.00	4.20	5.50	5.40
13	4.9	......	5.2	6.6	4.8	3.20	3.30	3.10	5.00	3.80	5.60	5.50
14	4.9	......	5.2	6.5	5.0	3.20	3.35	3.40	5.40	3.90	5.90	5.40
15	4.9	4.35	5.2	6.4	5.0	3.20	3.30	3.30	5.40	3.80	5.80	4.80
16	4.9	4.35	7.8	6.0	5.4	3.25	3.35	3.25	4.35	3.80	5.50	4.40
17	4.9	4.35	7.0	6.0	6.3	3.20	3.45	3.15	4.10	3.65	5.20	4.40
18	4.9	4.35	7.8	5.8	6.8	3.10	3.40	3.55	4.10	3.60	5.20	4.25
19	4.9	4.30	8.3	5.5	6.6	3.15	3.50	3.45	4.00	3.60	4.80	4.20
20	4.9	4.30	9.5	5.4	5.4	3.10	3.75	3.55	4.00	3.60	4.20	4.10
21	4.9	4.30	8.7	5.3	5.0	3.10	3.60	3.55	3.90	3.65	4.20	4.00
22	4.9	7.30	7.3	5.2	5.2	3.05	3.35	3.60	3.95	3.60	4.00	4.10
23	4.9	4.30	6.4	5.1	4.8	3.00	3.30	3.65	4.00	4.30	4.00	4.00
24	4.9	4.30	6.1	5.0	4.5	3.00	3.25	3.70	4.00	6.20	4.20	4.20
25	4.7	4.35	5.5	5.1	4.6	2.90	3.20	3.65	4.40	5.80	4.00	4.10
26	4.7	4.35	5.0	5.2	4.4	2.95	3.20	4.10	4.45	5.70	3.95	4.00
27	4.7	4.30	5.0	5.2	4.25	2.90	3.20	4.00	4.70	5.40	3.90	4.20
28	4.7	4.30	5.4	5.4	3.95	2.90	3.20	4.20	4.60	5.00	3.95	4.60
29	4.7	4.30	7.9	5.8	3.9	2.90	3.20	4.20	4.80	4.80	3.90	4.60
30	4.7	......	9.6	7.4	3.95	2.90	3.10	4.40	4.70	4.60	3.90	4.55
31	4.7	......	9.8	......	3.9	......	3.10	4.15	......	4.50	......	4.55

NOTE.—Relation of gage height to discharge affected by ice about Jan. 4 to Mar. 16.

Daily discharge, in second-feet, of Allegheny River at Red House, N. Y., for 1912.

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,060	....	22,900	8,750	940	256	423	2,160	2,320	1,850	1,920
2	4,310	....	26,200	7,080	884	256	500	2,860	2,860	2,000	2,490
3	4,060	....	24,000	5,630	1,120	287	722	6,780	4,610	1,850	7,720
4	....	....	20,300	3,690	775	256	540	5,630	3,690	1,850	7,560
5	....	....	17,300	2,860	775	256	460	4,610	2,860	1,780	4,610
6	....	....	18,300	2,670	775	287	460	4,140	1,300	1,920	7,080
7	....	....	15,900	2,490	626	318	386	2,860	1,180	3,260	5,630
8	....	....	14,100	2,320	583	318	540	2,490	1,240	4,610	5,630
9	....	....	14,550	2,160	540	423	386	2,000	1,180	4,610	4,140
10	....	....	12,050	2,000	500	386	352	1,440	1,060	3,910	3,060
11	....	....	11,250	2,000	460	500	352	2,160	1,440	3,910	3,260
12	....	....	9,800	2,160	460	540	352	2,860	1,570	3,910	3,690
13	....	....	6,780	2,490	460	540	386	2,860	1,060	4,140	3,910
14	....	....	6,480	2,860	460	583	626	3,690	1,180	4,850	3,690
15	....	....	6,190	2,860	460	540	540	3,690	1,060	4,610	2,490
16	....	....	5,100	3,690	500	583	500	1,780	1,060	3,910	1,850
17	....	8,050	5,100	5,910	460	674	423	1,440	884	3,260	1,850
18	....	10,850	4,610	7,390	386	626	775	1,440	828	3,260	1,640
19	....	12,850	3,910	6,780	423	722	674	1,300	828	2,490	1,570
20	....	18,300	3,690	3,690	386	1,000	775	1,300	828	1,570	1,440
21	....	14,550	3,470	2,860	386	828	775	1,180	884	1,570	1,300
22	....	9,100	3,260	3,260	352	583	828	1,240	828	1,300	1,440
23	....	6,190	3,060	2,490	318	540	884	1,300	1,710	1,300	1,300
24	....	5,360	2,860	2,000	318	500	940	1,300	5,630	1,570	1,570
25	....	3,910	3,060	2,160	256	460	884	1,850	4,610	1,300	1,440
26	....	2,860	3,260	1,850	287	460	1,440	1,920	4,370	1,240	1,300
27	....	2,860	3,260	1,640	256	460	1,300	2,320	3,690	1,180	1,570
28	....	3,690	3,690	1,240	256	460	1,570	2,160	2,860	1,240	2,160
29	....	11,250	4,610	1,180	256	460	1,570	2,490	2,490	1,180	2,160
30	....	18,800	9,450	1,240	256	386	1,850	2,320	2,160	1,180	2,080
31	....	19,800	....	1,180	....	386	1,500	....	2,000	....	2,080

NOTE.—Discharge Jan. 4 to Mar. 16 estimated because of ice.

Monthly discharge of Allegheny River at Red House, N. Y., for 1912.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January [a]	4,310	....	1,610	0.982	1.13	C.
February [a]	....	....	554	.338	.36	C.
March [a]	19,800	....	5,520	3.37	3.88	B.
April	26,200	2,860	9,480	5.78	6.45	A.
May	8,750	1,180	3,240	1.98	2.28	A.
June	1,120	256	497	.303	.34	B.
July	1,000	256	480	.293	.34	B.
August	1,850	352	765	.466	.54	B.
September	6,780	1,180	2,520	1.54	1.72	A.
October	5,630	828	2,070	1.26	1.45	A.
November	4,850	1,180	2,550	1.55	1.73	A.
December	7,720	1,300	3,020	1.84	2.12	A.
The year	26,200	256	2,690	1.64	22.34	

[a] Discharge Jan. 4 to Mar. 16 estimated because of ice.

ALLEGHENY RIVER AT KITTANNING, PA.

Location.—At the Market Street Bridge in the city of Kittanning, Pa., about 4 miles above the mouth of Crooked River and over 12 miles above the mouth of Kiskiminitas River.

Records available.—August 18, 1904, to December 31, 1912.

Drainage area.—9,010 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Accuracy.—Conditions of flow are practically constant and an excellent low and medium stage rating curve has been developed. At high stages numerous measurements have been made. There is, however, a marked difference between the discharge at a given high gage height for rising and for falling stage, due to increase and decrease of slope. The difference at times amounts to as much as 15 per cent, and as the variation differs for each flood it is difficult to determine accurately the daily discharge at high stages.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which has furnished all the records for 1912.

The following discharge measurement was made by the subsurface method by R. A. Boehringer, an engineer of the Pennsylvania Water Supply Commission:

December 8, 1912: Gage height, 9.93 feet; discharge, 34,400 second-feet.

Daily gage height, in feet, of Allegheny River at Kittanning, Pa., for 1912.

[Blaine Mast, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.15	8.85	8.90	15.50	11.60	3.95	2.00	3.10	9.30	5.25	6.55	4.60
2	9.03	8.90	8.60	18.50	10.40	3.70	1.90	3.00	11.20	5.10	5.80	6.10
3	8.05	8.80	8.10	[a]23.00	9.20	3.35	1.90	2.95	[b]16.20	4.85	5.40	5.80
4	7.45	8.85	7.30	17.80	8.00	3.20	1.80	2.80	12.10	4.60	5.15	8.80
5	6.75	8.75	6.60	15.10	7.30	3.15	1.85	2.55	9.30	4.40	4.90	9.25
6	6.20	8.60	5.80	13.80	6.80	3.40	2.40	2.35	8.20	4.10	4.60	9.10
7	6.40	8.35	5.60	13.10	6.60	3.55	2.35	2.20	7.80	3.90	5.80	8.20
8	7.05	8.20	5.70	12.40	6.60	3.50	2.25	2.45	7.30	3.70	6.60	7.45
9	6.80	8.05	5.90	12.30	6.40	3.20	2.10	2.60	7.05	3.45	7.90	7.40
10	6.55	7.90	5.90	11.60	6.40	2.95	2.00	2.80	6.40	3.20	8.60	7.30
11	6.85	7.80	5.70	11.05	6.20	2.80	2.05	3.20	5.90	3.30	8.90	6.90
12	6.75	7.65	5.50	10.60	6.10	2.65	2.40	3.30	5.30	3.90	8.00	6.40
13	6.55	7.55	5.40	10.40	6.20	2.50	3.30	3.25	4.60	4.30	7.30	5.95
14	6.50	7.50	7.20	9.70	6.30	2.45	3.10	3.10	4.10	4.20	6.50	5.60
15	6.30	7.50	9.05	8.95	6.90	2.60	2.80	2.90	3.90	4.05	6.10	5.25
16	6.35	7.50	9.50	9.30	7.40	4.20	2.70	2.70	4.20	3.90	6.90	5.05
17	6.60	7.50	16.40	9.30	7.80	3.80	3.15	2.55	4.00	4.20	6.40	5.40
18	7.25	7.70	13.70	9.05	8.30	3.65	[c]8.30	2.40	4.60	4.60	5.70	5.80
19	7.80	8.05	14.10	8.50	8.10	3.40	5.55	2.45	4.35	4.25	5.20	5.60
20	9.05	8.30	15.50	7.75	7.85	3.20	5.10	3.80	4.20	4.10	4.90	5.25
21	10.85	8.40	17.20	7.20	7.60	2.95	5.30	3.65	4.10	4.80	4.70	4.85
22	10.60	8.40	14.90	6.90	7.20	2.80	6.50	3.60	3.95	5.40	4.45	4.50
23	9.75	8.30	12.60	6.60	6.75	2.60	6.10	3.20	3.85	6.30	4.20	4.30
24	9.60	8.30	12.10	6.40	6.20	2.90	5.40	2.85	4.30	8.10	3.95	4.20
25	9.45	8.40	11.80	6.10	5.70	2.85	4.90	2.40	6.70	12.10	3.80	4.05
26	9.15	9.20	10.05	5.90	5.25	2.60	4.05	6.90	6.50	13.60	3.70	3.90
27	9.00	[d]13.25	9.55	5.80	4.80	2.40	3.70	10.40	5.60	12.05	3.55	3.80
28	8.85	9.90	9.10	5.70	4.40	2.25	3.45	8.20	4.95	10.20	3.45	4.00
29	8.90	9.30	11.30	6.00	4.00	2.15	3.20	7.40	4.80	9.00	3.30	4.30
30	8.75	....	[e]17.35	10.75	3.90	2.10	3.05	8.40	4.65	8.10	3.20	5.40
31	8.80	....	17.50	....	4.05	....	2.95	8.70	....	7.40	....	9.60

[a] Maximum, 23.4 feet at 9 a. m.; discharge, 169,000 second-feet.

[b] Maximum, 16.9 feet at 10 a. m.; discharge, 95,600 second-feet.

[c] Maximum, 9.2 feet at 11 a. m.; discharge, 33,000 second-feet.

[d] Maximum, 15.7 feet at 6 a. m.; discharge, 84,200 second-feet.

[e] Maximum, 17.9 feet at 5 p. m.; discharge, 106,000 second-feet.

NOTE.—River reported "frozen" Jan. 8 to Feb. 26. Floating ice Dec. 24 and 25.

Daily discharge, in second-feet, of Allegheny River at Kittanning, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	39,700		31,000	82,400	50,000	5,710	1,600	3,720	33,700	10,300	16,500	7,600
2	31,900		29,000	112,000	41,400	5,080	1,460	3,490	47,100	9,640	12,800	14,300
3	25,500		25,800	164,000	33,000	4,280	1,460	3,380	88,900	8,580	11,000	12,800
4	21,700		20,800	105,000	25,200	3,940	1,340	3,060	53,800	7,600	9,860	30,400
5	17,600		16,800	78,800	20,800	3,830	1,400	2,540	33,700	6,960	8,780	33,400
6	14,800		12,800	67,400	17,800	4,390	2,260	2,170	26,400	6,100	7,600	32,400
7	15,800		11,900	61,600	16,800	4,740	2,170	1,920	23,900	5,580	12,800	26.400
8	(a)		12,400	56,100	16,800	4,620	2,000	2,350	20,800	5,080	16,800	21,700
9			13,300	55,300	15,800	3,940	1,700	2,640	19,300	4,500	24,500	21,400
10			13,300	50,000	15,800	3,380	1,600	3,060	15,800	3,940	29,000	20,800
11			12,400	46,100	14,800	3,060	1,680	3,940	13,300	4,160	31,000	18,400
12			11,400	42,900	14,300	2,740	2,260	4,160	10,500	5,580	25,200	15,800
13			11,000	41,400	14,800	2,440	4,160	4,050	7,600	6,660	20,800	13,600
14			20,200	36,500	15,300	2,350	3,720	3,720	6,100	6,380	16,200	11.900
15			32,000	31,400	18,400	2,640	3,060	3,270	5,580	5,970	14,300	10,300
16			35,100	33,700	21,400	6,380	2,850	2,850	6,380	5,580	18,400	9,420
17			90,800	33,700	23,900	5,340	3,830	2,540	5,840	6,380	15,800	11,000
18			66,500	32,000	27,100	4,960	27,100	2,260	7,600	7,600	12,400	12,800
19			70,000	28,400	25,800	4,390	11,700	2,350	6,810	6,520	10,100	11,900
20			82,400	23,600	24,200	3,940	9,640	5,340	6,380	6,100	8,780	10,300
21			98,600	20,200	22,600	3,380	10,500	4,960	6,100	8,380	7,980	8,580
22			77,100	18,400	20,200	3,060	16,200	4,850	5,710	11,000	7,110	7,260
23			57,600	16,800	17,600	2,640	14,300	3,940	5,460	15,300	6,380	6,660
24			53,800	15,800	14,800	3,270	11,000	3,160	6,660	25,800	5,710	6,380
25			51,500	14,300	12,400	3,160	8,780	2,260	17,300	53,800	5,340	5,970
26		(a)	39,000	13,300	10,300	2,640	5,970	18,400	16,200	65,700	5,080	5,580
27		62,800	35,400	12,800	8,380	2,260	5,080	41,400	11,900	53,400	4,740	5,340
28		37,900	32,400	12,400	6,960	2,000	4,500	26,400	8,990	40,000	4,500	5,840
29		33,700	47,900	13,800	5,840	1,840	3,940	21,400	8,380	31,700	4,160	6,660
30			100,000	43,900	5,580	1,760	3,600	27,800	7,790	25,800	3,940	11,000
31			102,000		5,970		3,380	29,700		21,400		35,800

[a] Discharge Jan. 8 to Feb. 26 estimated because of ice from the flow of West Branch of Susquehanna River at Williamsport, Blacklick Creek, and Brokenstraw Creek, and from climatologic records. Mean discharge Jan. 8–31 estimated 9,900 second-feet. Mean discharge Feb. 1–26 estimated 8,100 second-feet.

NOTE.—Below gage height 15.0 feet, the rating curve used by the commission differs slightly from that used by the Survey in computation for 1911 published in Water-Supply Paper 303. See footnotes to table of daily gage height for crest discharges.

Monthly discharge of Allegheny River at Kittanning, Pa., for 1912.

[Drainage area, 9,010 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.[a]	Minimum.	Mean.	Per square mile.	
January	39,700		13,100	1.454	1.676
February	84,200		11,900	1.321	1.425
March	106,000	11,000	42,394	4.705	5.424
April	169,000	12,400	45,467	5.046	5.630
May	50,000	5,580	18,840	2.091	2.411
June	6,380	1,760	3,605	.400	.446
July	33,000	1,340	5,623	.624	.719
August	41,400	1,920	7,970	.885	1.020
September	95,600	5,460	17,799	1.975	2.204
October	65,700	3,940	15,532	1.724	1.987
November	31,000	3,940	12,585	1.397	1.559
December	35,800	5,340	14,571	1.617	1.864
The year	169,000		17,400	1.937	26.365

[a] Crest discharge where available.

NOTE.—See footnotes to table of daily discharge.

KISKIMINITAS RIVER AT AVONMORE, PA.

Location.—At the highway bridge near Avonmore station on the Pennsylvania Railroad, about 4 miles below the mouth of Blacklegs Creek, about 1 mile above the mouth of Long Run, and about 5 miles below the junction of Conemaugh River with Loyalhanna Creek to form the Kiskiminitas.

Records available.—June 11, 1907, to December 31, 1912.

Drainage area.—1,720 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from the downstream side of the bridge.

Floods.—The flood of March 19, 1908, reached a height of 30.8 feet on the gage, and its discharge was estimated at 80,500 second-feet, or about 47 second-feet per square mile from a drainage area of 1,720 square miles.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which has furnished all the records and data for 1912.

The following discharge measurement was made by R. A. Boehringer, an engineer of the Water Supply Commission of Pennsylvania:

December 6, 1912: Gage height, 6.43 feet; discharge, 3,310 second-feet.

Daily gage height, in feet, of Kiskiminitas River at Avonmore, Pa., for 1912.

[Ralph Fickes, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.65	11.24	7.85	8.52	9.00	3.58	4.38	5.94	6.04	6.02	4.92	3.38
2	8.40	11.29	6.15	8.85	7.70	3.41	3.68	5.21	10.84	5.35	4.80	3.30
3	7.22	10.78	5.30	10.08	6.98	3.30	3.45	5.40	[a]19.06	4.92	4.55	3.68
4	6.50	10.51	4.90	8.54	6.14	3.35	3.88	5.32	15.46	4.65	4.24	4.30
5	5.92	10.05	4.64	7.59	5.70	3.24	3.74	4.68	10.08	4.22	3.96	3.80
6	[b]6.00	10.15	4.44	6.92	5.40	3.15	3.80	4.30	8.38	4.05	3.92	5.94
7	6.80	10.25	4.29	6.45	5.65	3.15	3.50	3.96	7.35	3.78	4.70	7.00
8	6.80	10.36	4.84	7.08	6.89	3.15	3.12	3.77	7.31	3.70	8.66	5.95
9	6.60	10.01	6.70	6.35	6.62	2.98	2.92	3.69	6.18	3.61	6.96	5.30
10	6.40	9.70	6.08	5.90	5.85	2.72	2.80	3.65	5.20	3.92	6.20	4.62
11	6.40	9.40	5.30	5.52	5.40	2.79	3.16	3.98	4.75	5.50	5.70	4.75
12	6.40	9.38	5.22	5.20	5.20	2.76	3.32	4.82	4.38	4.45	5.20	4.42
13	6.35	9.40	7.56	5.45	5.50	2.68	3.04	4.60	4.15	3.90	4.98	3.62
14	6.05	9.55	6.59	5.60	6.04	2.62	2.88	4.80	3.90	3.60	4.95	3.65
15	5.90	9.48	11.70	5.38	5.38	2.68	2.62	4.82	3.80	3.40	5.25	4.06
16	5.90	9.35	15.65	5.46	5.85	8.45	3.20	4.40	3.98	3.39	4.70	4.02
17	5.75	9.35	10.80	5.40	12.90	16.25	4.83	3.90	4.80	3.30	5.02	4.00
18	5.88	9.45	10.58	8.85	9.62	9.52	6.83	3.62	4.08	3.25	4.25	3.85
19	12.40	9.92	10.45	8.90	7.81	7.18	9.65	4.22	4.80	3.42	4.16	4.08
20	16.12	12.45	11.70	7.45	6.90	5.85	6.72	9.46	4.95	3.52	3.94	4.42
21	15.55	14.18	[c]23.87	6.65	6.14	5.32	12.10	7.68	4.20	3.72	3.98	4.02
22	14.80	16.18	19.74	6.10	5.52	4.96	16.60	6.33	3.72	3.44	3.86	3.70
23	13.90	13.18	12.46	6.10	5.12	4.55	9.88	6.75	3.68	5.80	3.76	3.40
24	15.02	12.58	12.30	6.04	4.75	4.32	11.75	6.75	7.40	8.46	3.74	3.55
25	14.20	12.45	13.35	5.52	4.42	4.20	13.08	5.55	9.60	9.54	3.60	3.74
26	13.22	[b]16.70	10.30	5.20	4.16	3.90	9.35	4.70	7.70	[d]10.60	3.68	3.70
27	12.95	[e]17.72	9.00	5.28	3.90	3.68	7.60	4.88	11.63	8.55	3.58	3.60
28	11.95	12.27	9.35	6.26	3.78	3.52	6.29	5.11	9.88	7.20	3.51	4.22
29	11.78	8.62	11.68	5.82	3.75	3.72	5.94	5.32	7.55	6.25	3.40	4.09
30	12.70	....	12.58	9.12	3.85	4.20	6.94	4.88	6.80	5.65	3.15	4.75
31	11.95	....	9.80	....	3.90	....	6.05	4.80	....	5.22	....	9.82

[a] Maximum, 22.3 feet at 5 p. m.; discharge, 47,400 second-feet.

[b] Frozen Jan. 6 to Feb. 26. Ice broke and gorged Jan. 19 and gorge remained until Feb. 27, when it went out at 1.30 a. m.

[c] Maximum, 28.0 feet during night; discharge, 69,400 second-feet.

[d] Maximum, 11.0 feet at 8.30 a. m.; discharge, 12,200 second-feet.

[e] Maximum, 19.2 feet at 8.30 a. m.; discharge, 36,500 second-feet.

Daily discharge, in second-feet, of Kiskiminitas River at Avonmore, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,360		6,260	7,350	8,180	1,110	1,790	3,600	3,730	3,710	2,350	956
2	7,150		3,880	7,920	6,020	978	1,190	2,690	11,800	2,860	2,220	900
3	5,310		2,800	10,200	4,970	900	1,010	2,920	36,000	2,350	1,960	1,190
4	4,830		2,330	7,390	3,860	935	1,360	2,820	24,400	2,060	1,670	1,720
5	3,580		2,050	5,860	3,300	881	1,240	2,090	10,200	1,650	1,430	1,290
6	(a)		1,850	4,890	2,920	802	1,290	1,720	7,120	1,500	1,390	3,600
7			1,710	4,260	3,230	802	1,040	1,430	5,500	1,270	2,110	5,000
8			2,260	5,110	4,850	802	783	1,260	5,440	1,200	7,590	3,620
9			4,600	4,140	4,490	692	653	1,200	3,910	1,130	4,950	2,800
10			3,780	3,550	3,480	540	580	1,160	2,680	1,390	3,940	2,030
11			2,800	3,070	2,920	575	809	1,440	2,160	3,040	3,300	2,160
12			2,700	2,680	2,680	560	914	2,240	1,790	1,860	2,680	1,830
13			5,810	2,980	3,040	520	731	2,010	1,590	1,380	2,420	1,140
14			4,450	3,170	3,730	490	628	2,220	1,380	1,120	2,390	1,160
15			14,000	2,900	2,900	520	490	2,240	1,290	970	2,740	1,510
16			25,000	3,000	3,480	7,240	835	1,810	1,440	963	2,110	1,480
17			11,800	2,920	17,200	26,800	2,240	1,380	2,220	900	2,470	1,460
18			11,300	7,920	9,310	9,120	4,760	1,140	1,530	868	1,680	1,330
19			11,000	8,000	6,200	5,250	9,370	1,650	2,220	985	1,600	1,530
20			14,000	5,640	4,860	3,480	4,620	9,010	2,390	1,060	1,410	1,830
21			53,300	4,530	3,860	2,820	15,000	5,990	1,630	1,220	1,440	1,480
22			38,400	3,810	3,070	2,400	27,900	4,110	1,220	1,000	1,340	1,200
23			16,000	3,810	2,580	1,960	9,820	4,660	1,190	3,420	1,260	970
24			15,600	3,730	2,160	1,740	14,100	4,660	5,570	7,250	1,240	1,060
25			18,400	3,070	1,830	1,630	17,600	3,110	9,280	9,160	1,120	1,240
26		(a)	10,700	2,680	1,600	1,380	8,810	2,110	6,020	11,300	1,190	1,200
27		31,600	8,180	2,780	1,380	1,100	5,870	2,310	13,800	7,400	1,110	1,120
28		15,500	8,810	4,020	1,270	1,060	4,060	2,570	9,820	5,280	1,050	1,650
29		7,520	13,900	3,450	1,250	1,220	3,600	2,820	5,800	4,000	970	1,540
30			16,300	8,390	1,330	1,630	4,920	2,310	4,730	3,230	802	2,160
31			9,660		1,380		3,740	2,220		2,700		9,700

[a] Discharge Jan. 6 to Feb. 26 estimated because of ice from flow of Blacklick Creek at Blacklick, Pa., and from climatologic records. Mean discharge Jan. 6–31 estimated 2,700 second-feet. Mean discharge Feb. 1–26 estimated 2,800 second-feet. The rating curve used by the Water Supply Commission of Pennsylvania differs slightly, below gage height 13.0 feet, from that used by the Survey in computing values for 1911 published in Water-Supply Paper 303. See footnotes to table of daily gage height for crest discharges.

Monthly discharge of Kiskiminitas River at Avonmore, Pa., for 1912.

[Drainage area, 1,720 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.[a]	Minimum.	Mean.	Per square mile.	
January			3,220	1.872	2.158
February	36,500		4,390	2.552	2.752
March	69,400	1,710	11,100	6.453	7.440
April	10,200	2,680	4,770	2.773	3.094
May	17,200	1,250	3,980	2.314	2.668
June	26,800	490	2,670	1.552	1.731
July	27,900	490	4,900	2.849	3.285
August	9,010	1,140	2,670	1.552	1.789
September	47,400	1,190	6,260	3.640	4.061
October	12,200	868	2,850	1.657	1.910
November	7,590	802	2,130	1.238	1.381
December	9,700	900	2,000	1.163	1.341
The year			4,240	2.468	33.610

[a] Crest discharge used when available. See footnotes to table of daily gage height.

BLACKLICK CREEK AT BLACKLICK, PA.

Location.—At highway bridge about one-fourth mile from the railroad station at Blacklick, Pa., about 1 mile below the junction of Blacklick and Two Lick creeks and about 6 miles above the junction of Blacklick Creek with Conemaugh River.

Records available.—August 16, 1904, to July 15, 1906; January 8, 1907, to December 31, 1912.

Drainage area.—386 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Fairly permanent.

Discharge measurements.—At high and medium stages made from the upstream side of the highway bridge; at low stages made by wading at a section just above the bridge. Extreme high-water measurements are made from the coal tipple one-fourth mile above the bridge, but no measurements have been made from it in the last few years.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Cooperation.—Since January 8, 1907, station has been maintained by the Water Supply Commission of Pennsylvania, which supplied all the records for 1912.

Remarks.—Changes in rating curves necessitated by the reconstruction of the highway bridge were discussed in Water-Supply Paper 263, page 43. The rating curve used in 1912 differs above 1,800 second-feet from that used in previous years as a result of 5 discharge measurements made during 1912 and 1913 (before the preparation of this report).

Discharge measurements of Blacklick Creek at Blacklick, Pa., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 1	R. A. Boehringer[a]	2.95	[b]305
Dec. 6	....do	5.30	[b]2,370

[a] An engineer of the Water Supply Commission of Pennsylvania.
[b] Measurement made by the subsurface method.

Daily gage height, in feet, of Blacklick Creek at Blacklick, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.97	3.01	3.97	4.68	4.88	2.67	2.52	3.44	3.45	3.48	3.48	2.68
2	4.29	2.99	3.64	5.49	4.42	2.62	2.46	3.24	8.17	3.26	3.44	2.82
3	4.07	2.98	3.36	5.80	4.05	2.67	2.48	3.50	[a]11.86	3.16	3.28	3.53
4	3.73	2.82	3.32	4.78	3.82	2.61	2.46	3.22	7.98	3.06	3.14	3.18
5	3.28	2.76	3.26	4.44	3.58	2.56	2.60	2.98	5.49	2.96	3.04	3.04
6	[b]3.29	2.74	3.16	4.14	3.54	2.55	2.62	2.86	4.65	2.87	2.98	4.98
7	3.29	2.72	3.13	4.08	3.60	2.55	2.57	2.78	4.20	2.78	3.58	4.88
8	3.37	2.70	3.42	4.33	4.10	2.48	2.40	2.72	3.96	2.69	4.14	4.11
9	3.39	2.98	4.38	3.92	3.94	2.40	2.31	2.68	3.56	3.16	3.69	3.72
10	3.44	2.84	3.80	3.72	3.71	2.33	2.52	2.84	3.32	3.24	3.60	3.44
11	3.31	[b]2.77	3.55	3.58	3.46	2.26	2.76	2.98	3.16	2.92	3.53	3.68
12	3.23	2.62	3.62	3.48	3.42	2.22	2.60	3.63	3.06	2.80	3.46	3.83
13	3.09	2.66	4.56	3.94	3.76	2.22	2.50	3.48	2.96	2.74	3.41	[b]3.78
14	3.16	2.56	3.96	3.74	3.61	2.20	2.44	3.37	2.88	2.72	3.40	3.51
15	3.01	2.50	7.89	3.60	3.38	2.56	2.90	3.28	2.86	2.70	3.31	3.16
16	2.97	2.43	6.91	3.64	[c]5.84	[d]8.10	2.86	3.09	3.11	2.62	3.20	3.14
17	2.97	2.44	5.44	3.61	6.04	6.46	3.53	2.88	2.99	2.60	3.10	3.10
18	3.03	2.46	5.48	[e]5.99	5.08	4.70	5.70	2.80	2.87	2.58	3.04	3.16
19	[f]4.47	2.72	5.40	4.74	4.46	3.97	4.32	2.82	3.18	2.82	3.00	3.28
20	4.53	[f][g]4.42	5.62	4.39	4.12	3.58	3.58	4.01	3.06	3.08	2.98	3.16
21	4.13	4.56	[h]10.20	4.06	3.76	3.39	[i]6.00	3.90	2.80	2.84	2.94	3.18
22	3.77	4.98	7.36	3.76	3.52	3.38	6.38	3.84	2.70	2.72	2.88	3.19
23	3.79	4.18	5.48	3.88	3.32	3.20	4.62	3.83	3.10	5.89	2.83	3.08
24	4.05	3.82	6.39	3.70	3.17	3.25	4.80	3.64	4.28	5.31	2.80	2.92
25	3.84	3.80	6.16	3.55	3.06	3.11	4.78	3.30	4.00	[j]6.60	2.82	[k]2.86

[a] Maximum, 12.9 feet at noon; discharge, 21,000 second-feet.
[b] Creek frozen across.
[c] Maximum, 7.36 at 6 p. m.; discharge, 6,240 second-feet.
[d] Maximum, 9.6 feet at 2 p. m.; discharge, 11,200 second-feet.
[e] Maximum, 6.42 feet at 1 p. m.; discharge, 4,300 second-feet.
[f] Ice going out.
[g] On Feb. 20 ice gorge about 15 feet high formed one-half mile above gage; went out on Feb. 26.
[h] Maximum, 11.1 feet at 1 p. m.; discharge, 15,200 second-feet.
[i] Maximum, 7.9 feet at 7 p. m.; discharge, 7,370 second-feet.
[j] Maximum, 7.1 feet at 6 p. m.; discharge, 5,690 second-feet.
[k] Ice all out of creek.

Daily gage height, in feet, of Blacklick Creek at Blacklick, Pa., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	3.55	[a] 6.69	5.14	3.54	2.92	2.88	4.02	3.20	3.66	6.20	2.79	2.80
27	3.35	[b] 8.40	4.71	3.59	2.82	2.82	3.68	3.88	4.38	5.04	2.76	2.92
28	3.18	5.58	5.40	3.48	2.78	2.66	3.38	3.49	3.78	4.45	2.73	2.91
29	3.18	4.54	6.98	3.91	2.81	2.62	3.50	3.42	3.66	4.06	2.66	2.75
30	3.25	......	5.74	5.62	2.93	2.58	3.40	3.32	3.72	3.78	2.66	3.76
31	3.13	......	5.16	......	2.82	......	3.14	3.29	......	3.56	......	5.38

[a] On Feb. 20 ice gorge about 15 feet high formed one-half mile above gage; went out on Feb. 26.
[b] Maximum, 9.6 feet at 7 a. m.; discharge, 11,200 second-feet.

Daily discharge, in second-feet, of Blacklick Creek at Blacklick, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,930	324	941	1,600	1,820	195	146	551	558	577	577	198
2	1,220	316	688	2,660	1,340	179	128	437	7,940	448	551	248
3	1,020	312	503	3,160	1,010	195	134	590	17,500	395	459	611
4	752	248	481	1,710	821	175	128	426	7,540	347	385	405
5	459	226	448	1,360	646	159	172	312	2,660	304	338	338
6	464	219	395	1,090	618	156	179	264	1,570	268	312	1,940
7	464	212	380	1,030	660	156	162	233	1,140	233	646	1,820
8	508	205	538	1,260	1,050	134	110	212	933	202	1,090	1,060
9	520	312	1,300	901	917	110	86	198	632	395	723	745
10	551	256	805	745	738	91	146	256	481	437	660	551
11	476	230	625	646	564	73	226	312	395	288	611	716
12	432	179	674	577	538	64	172	681	347	240	564	829
13	360	192	1,480	917	775	64	140	577	304	219	532	790
14	395	159	925	760	667	59	122	508	272	212	525	597
15	324	140	7,350	660	514	159	280	459	264	205	476	395
16	308	119	5,290	688	3,230	7,790	264	360	370	179	415	385
17	308	122	2,590	667	3,580	4,380	611	272	316	172	365	365
18	334	128	2,650	3,490	2,060	1,620	3,000	240	268	166	338	395
19	1,390	212	2,520	1,660	1,380	941	1,250	248	405	248	320	459
20	1,450	1,340	2,870	1,310	1,070	646	646	974	356	356	312	395
21	1,080	1,480	12,700	1,020	775	520	3,510	885	240	256	296	405
22	782	1,940	6,240	775	604	514	4,220	837	205	212	272	410
23	798	1,120	2,650	869	481	415	1,540	829	365	3,320	252	356
24	1,010	821	4,240	730	400	442	1,730	688	1,210	2,390	240	288
25	837	805	3,800	625	347	370	1,710	470	965	4,660	248	264
26	625	4,840	2,150	618	288	272	982	415	702	3,880	236	240
27	498	8,440	1,630	653	248	248	716	869	1,300	2,010	226	288
28	405	2,810	2,520	577	233	192	514	584	790	1,870	216	284
29	405	1,460	5,440	893	244	179	590	538	702	1,020	192	222
30	442	......	3,070	2,870	292	166	523	481	745	790	192	775
31	380	......	2,170	......	248	......	385	464	......	632	......	2,500

NOTE.—Open-water discharge rating curve used throughout year. See footnotes to table of daily gage height.

Monthly discharge of Blacklick Creek at Blacklick, Pa., for 1912.

[Drainage area, 386 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.[a]	Minimum.	Mean.	Per square mile.	
January	1,930	308	675	1.749	2.017
February	11,200	119	1,006	2.606	2.811
March	15,200	380	2,583	6.692	7.715
April	4,300	577	1,217	3.153	3.518
May	6,240	233	908	2.352	2.711
June	11,200	59	689	1.785	1.992
July	7,370	86	791	2.049	2.362
August	974	198	489	1.267	1.461
September	21,000	205	1,716	4.446	4.961
October	5,690	166	853	2.210	2.548
November	1,090	192	419	1.085	1.210
December	2,500	198	622	1.611	1.857
The year	21,000	59	997	2.584	35.163

[a] Crest discharge used where available. See footnotes to table of daily gage height.

MONONGAHELA RIVER BASIN.

TYGART RIVER AT BELINGTON, W. VA.

Location.—At highway bridge at Belington, W. Va., one-fourth mile above the mouth of Mill Creek.

Records available.—June 5, 1907, to December 31, 1912.

Drainage area.—390 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation above sea level of the zero of the gage is 1,679.89 feet.

Channel.—Practically permanent.

Discharge measurements.—Made from upstream side of the bridge.

Floods.—The flood of July, 1912, reached a stage of 20.3 feet referred to the present gage.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Accuracy.—The discharge rating curves for this station are poorly defined above 2,500 second-feet, being simply extensions, and all discharge values above that point should be used with due regard for this fact.

The following discharge measurement was made by C. T. Bailey:

September 4, 1912: Gage height, 2.98 feet; discharge, 194 second-feet.

Daily gage height, in feet, of Tygart River at Belington, W. Va., for 1912.

[S. A. Campbell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.8	5.6	5.0	5.7	3.95	2.73	3.24	4.1	3.41	2.99	2.50	2.64
2	6.4	4.8	4.4	5.0	3.95	2.69	3.0	4.5	3.75	2.90	2.53	2.51
3	5.2	4.25	4.0	5.4	3.85	2.63	3.0	3.95	3.21	2.82	2.53	2.80
4	4.6	4.9	3.95	5.5	3.60	2.62	3.43	3.6	3.00	2.72	2.53	2.81
5	4.1	4.9	3.8	5.1	3.55	2.58	4.3	3.37	2.82	2.54	2.52	3.20
6	3.9	......	3.7	4.7	3.49	2.54	4.6	3.19	2.70	2.51	2.49	4.1
7	3.43	......	3.65	4.45	3.44	2.53	3.11	3.07	2.64	2.48	2.64	4.8
8	2.94	......	3.75	4.2	4.8	2.50	3.23	2.97	2.52	2.48	6.7	4.0
9	2.83	4.3	4.45	4.3	5.7	2.46	3.38	2.87	2.51	2.44	5.6	3.85
10	4.7	4.0	4.6	4.15	4.8	2.40	3.9	2.82	2.46	2.40	4.6	3.65
11	4.25	3.9	4.7	4.0	4.2	2.44	3.55	2.78	2.37	2.35	3.7	3.40
12	4.25	3.85	4.35	3.8	5.5	2.28	3.85	2.75	2.30	2.35	4.45	3.27
13	4.25	......	5.0	3.44	10.3	2.18	3.42	2.68	2.30	2.30	3.28	3.27
14	......	......	6.9	3.42	7.3	2.19	3.28	2.67	2.23	2.27	3.20	3.20
15	......	......	6.3	3.47	6.8	2.18	3.23	2.62	2.20	2.26	3.22	2.91
16	......	3.6	12.2	3.38	6.4	2.28	3.7	2.57	2.46	2.23	3.15	2.88
17	......	......	8.4	4.45	12.0	2.62	3.75	2.54	2.57	2.23	3.06	2.90
18	......	......	6.0	4.45	7.1	3.6	3.8	2.53	2.57	2.22	3.00	2.92
19	9.9	......	5.1	5.9	5.7	4.0	11.1	2.52	2.57	2.22	2.92	2.95
20	9.1	*a* 5.5	5.4	4.8	5.0	4.0	6.3	2.67	2.42	2.22	2.86	2.85
21	7.6	6.3	6.7	4.35	4.45	4.05	6.2	3.40	2.44	2.22	2.84	2.82
22	5.1	7.8	7.9	4.0	4.0	3.5	8.9	3.38	2.38	2.44	2.80	2.81
23	4.6	6.3	7.0	4.0	3.7	3.55	11.7	3.19	2.31	2.50	2.73	2.80
24	4.5	5.9	7.0	4.7	3.5	3.6	5.7	3.17	4.6	2.50	2.64	2.90
25	4.4	5.4	9.0	4.3	3.34	4.6	17.4	2.99	5.5	2.64	2.57	2.80
26	4.0	5.2	7.2	4.0	3.19	5.6	13.8	2.06	4.45	2.87	2.70	2.75
27	3.75	11.6	7.5	3.85	3.08	4.4	6.0	2.87	3.65	2.86	2.64	2.89
28	3.9	9.2	4.9	3.75	2.98	3.8	5.2	3.39	3.34	2.78	2.61	3.12
29	5.0	5.9	5.0	3.75	2.93	3.6	4.05	2.97	3.21	2.70	2.50	3.65
30	9.7	......	8.4	3.80	2.95	3.39	5.0	2.88	3.05	2.62	2.50	3.9
31	7.4	......	7.5	......	2.88	......	4.7	3.21	......	2.55	......	10.2

a Gage height Feb. 20 to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 9–19 and about Feb. 4–20. Observer reported as follows: "Jan. 12, river at gage and at control frozen over; average thickness of ice, 6 inches. Jan. 19, ice going out; average thickness of ice, 8 inches. Feb. 5 to 16 river at gage and at control frozen over; average thickness of ice, 4 to 6 inches."

Daily discharge, in second-feet, of Tygart River at Belington, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,210	1,500	1,130	1,560	570	117	260	679	350	197	84	110
2	2,070	1,020	707	1,130	570	108	183	896	505	172	89	86
3	1,250	720	595	1,370	522	96	183	603	269	151	89	146
4	904	....	570	1,440	407	94	334	435	200	128	89	149
5	644	....	498	1,190	385	87	745	333	151	91	88	265
6	546	....	452	959	359	80	904	262	123	86	82	679
7	334	....	430	824	338	78	216	222	110	81	110	1,070
8	167	....	475	694	1,020	73	257	192	88	81	2,390	628
9	....	....	824	745	1,560	67	313	164	86	74	1,580	554
10	....	....	904	669	1,020	59	546	151	73	68	954	458
11	....	....	959	595	694	65	385	141	64	61	481	346
12	....	....	771	498	1,440	45	522	134	54	61	868	292
13	....	....	1,130	338	5,840	34	329	119	54	54	296	292
14	....	....	2,460	329	2,790	35	275	117	45	50	265	265
15	....	....	2,000	350	2,380	34	257	106	41	49	273	175
16	....	....	8,070	313	2,070	45	452	97	78	45	248	167
17	....	....	3,810	824	7,830	94	475	91	97	45	219	172
18	....	....	1,780	824	2,620	407	498	89	97	44	200	178
19	....	....	1,190	1,700	1,560	595	6,760	88	97	44	178	186
20	4,520	....	1,370	1,020	1,130	595	2,000	117	71	44	162	159
21	3,050	2,000	2,300	771	824	620	1,920	346	74	44	156	151
22	1,190	3,230	3,320	595	595	363	4,310	338	65	74	146	149
23	904	2,000	2,540	595	452	385	7,470	262	55	84	130	146
24	850	1,700	2,540	959	363	407	1,560	255	954	84	110	172
25	797	1,370	4,410	745	298	904	14,700	197	1,520	110	97	146
26	595	1,250	2,700	595	243	1,500	10,000	25	868	164	123	134
27	475	7,350	2,960	522	207	797	1,860	164	458	162	110	169
28	546	4,620	1,070	475	178	498	1,320	342	321	141	104	238
29	1,130	1,700	1,130	475	164	407	654	192	269	123	84	458
30	5,170	....	3,810	498	170	317	1,200	167	216	106	84	578
31	2,870	....	2,960	....	151	....	1,010	269	....	93	....	5,720

NOTE.—Daily discharge computed from two rating curves fairly well defined between 40 and 2,500 second-feet and poorly defined above 2,500 second-feet. The 1907–1911 rating curve was used Jan. 1 to July 25, 1912, and a new curve from July 26 to Dec. 31, 1912. The change in rating curve is based on two discharge measurements made Sept. 4, 1912, and Mar. 30, 1913 (before the preparation of this report). The new curve was made to coincide with the old above 4,900 second-feet. See "Accuracy."

Discharge Jan. 9–19 and Feb. 4–20 estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 9–19, 500 second-feet; Feb. 4–20, 400 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Tygart River at Belington, W. Va., for 1912.

[Drainage area, 390 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	5,170	....	1,220	3.13	3.61	D.
February	7,350	....	1,220	3.13	3.38	D
March	8,070	430	1,930	4.95	5.71	C.
April	1,700	313	787	2.02	2.25	B.
May	7,830	151	1,250	3.21	3.70	B.
June	1,500	34	300	.769	.86	B.
July	14,700	183	2,000	5.13	5.91	C.
August	896	25	245	.628	.72	B.
September	1,520	41	249	.638	.71	B.
October	197	44	90.7	.233	.27	C.
November	2,390	82	330	.846	.94	B.
December	5,720	86	466	1.19	1.37	B.
The year	14,700	....	842	2.16	29.43	

NOTE.—See footnote to table of daily discharge.

TYGART RIVER AT FETTERMAN, W. VA.

Location.—At highway bridge at Fetterman, W. Va., three-fourths mile above mouth of Otter Creek.

Records available.—June 3, 1907, to December 31, 1912.

Drainage area.—1,340 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation above sea level of the zero of the gage is 957.86 feet.

Channel.—Practically permanent; broken by one pier. Current sluggish at low stages.

Discharge measurements.—Made from downstream side of bridge.

Floods.—No records of floods previous to installation of gage are available. The flood of July, 1912, reached a stage of 29.1 feet, the highest recorded since the station was established.

Winter flow.—Ice probably does not affect the relation of gage height to discharge. It is said that the riffle below the gage usually remains open.

The following discharge measurement was made by C. T. Bailey:

September 2, 1912: Gage height, 5.06 feet; discharge, 1,860 second-feet.

Daily gage height, in feet, of Tygart River at Fetterman, W. Va., for 1912.

[Joseph Gerken, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.4	7.0	6.1	7.2	5.25	3.88	4.75	5.4	6.2	4.3	3.70	3.68
2	7.4	6.0	5.8	6.4	5.3	3.83	4.5	5.2	5.3	4.2	3.68	3.72
3	6.4	5.7	5.6	7.4	5.2	3.68	4.25	5.0	4.65	4.1	3.58	3.78
4	5.8	5.4	5.2	7.1	4.95	3.68	4.15	4.8	5.05	4.0	3.50	3.88
5	5.5	5.1	4.9	6.3	4.7	3.66	5.05	4.4	4.7	3.98	3.50	4.15
6	4.9	[a]5.0	4.75	5.8	4.55	3.70	5.8	4.25	4.2	3.78	3.50	5.6
7	4.75	5.0	4.7	5.3	4.55	3.90	5.2	4.1	4.0	3.60	4.2	6.1
8	4.7	[a]4.7	4.55	5.5	4.7	3.76	4.25	4.05	3.95	3.50	8.6	5.7
9	4.5	[a]4.55	5.0	5.4	5.7	3.70	4.25	3.99	3.85	3.42	7.6	5.5
10	4.95	[a]4.4	5.7	5.3	5.7	3.56	4.35	3.97	3.72	3.40	6.0	5.4
11	5.3	4.3	5.7	5.15	5.2	3.48	4.65	3.95	3.60	3.40	5.25	4.6
12	5.25	[a]4.3	5.6	4.95	5.15	3.46	4.25	4.0	3.58	3.40	4.8	4.2
13	[a]4.9	[a]4.3	6.7	4.8	10.6	3.28	4.15	4.2	3.52	3.38	4.6	4.1
14	4.8	4.5	8.8	4.6	8.2	3.13	4.1	3.92	3.45	3.35	4.5	4.0
15	4.8	[a]4.2	12.0	4.65	6.8	3.23	3.95	4.0	3.38	3.50	4.4	4.0
16	4.7	[a]4.0	14.8	4.5	8.9	3.36	3.87	3.97	3.35	3.48	4.3	4.0
17	4.5	[a]4.3	11.6	4.35	12.8	3.70	4.1	3.95	3.18	3.42	4.3	4.05
18	4.5	[a]4.6	8.1	6.3	9.1	4.0	5.6	3.87	3.25	3.40	4.2	4.15
19	10.7	4.9	6.7	6.2	7.3	4.7	9.0	3.87	4.1	3.42	4.1	4.05
20	12.1	6.3	8.8	5.7	6.3	4.8	7.2	4.7	4.1	3.38	4.0	3.95
21	8.4	8.5	10.2	5.15	5.45	4.75	5.7	4.5	3.85	3.35	4.0	3.9
22	7.2	10.0	11.2	5.05	5.1	4.55	9.7	4.45	3.78	3.30	4.0	3.85
23	6.0	7.9	9.2	4.9	4.8	4.75	12.3	4.45	4.3	3.42	3.98	3.95
24	5.6	7.0	10.4	4.95	4.55	4.85	7.2	4.4	6.2	3.52	3.95	4.0
25	5.45	6.2	10.8	4.95	4.4	5.05	24.4	4.25	6.4	3.65	3.95	4.05
26	5.4	7.5	7.7	4.75	4.25	5.8	15.4	4.15	5.9	3.68	4.0	4.1
27	5.1	14.0	6.8	5.05	4.05	5.7	7.5	4.5	5.3	3.95	3.98	4.25
28	4.95	10.7	6.1	5.2	3.96	5.35	5.8	4.4	4.8	4.0	3.90	4.6
29	5.8	7.1	6.0	5.1	3.93	5.0	5.3	4.45	4.6	3.90	3.90	4.8
30	11.7	....	10.2	5.15	3.98	4.65	5.7	4.35	4.4	3.82	3.75	6.6
31	9.2	....	9.0	....	3.90	....	5.8	4.2	....	3.78	....	12.2

[a] Gage height to top of ice.

NOTE.—Observer reported floating ice, shore ice, river partly frozen over, and control section open Jan. 5-17 and Feb. 3-10; average thickness of ice at gaging section 1 to 5 inches; and thin ice on the river Dec. 14-28. The relation of gage height to discharge was probably not materially affected by ice during 1912.

Daily discharge, in second-feet, of Tygart River at Fetterman, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,860	5,370	3,740	5,740	2,250	438	1.400	2,510	3,920	802	323	312
2	6 110	3,560	3 210	4,280	2,330	404	1,040	2,160	2,330	699	312	335
3	4,280	3,030	2,850	6,110	2,160	312	750	1,820	1,250	607	258	372
4	3,210	2,510	2,160	5,550	1,740	312	653	1.480	1,900	525	218	438
5	2,680	1,990	1,650	4,100	1,320	301	1,900	916	1,320	510	218	653
6	1,650	1,820	1,400	3,210	1,110	323	2,330	750	699	372	218	2,850
7	1,400	1,820	1,320	2,330	1,110	451	2,160	607	525	268	699	3,740
8	1,320	1,320	1,110	2.680	1,320	360	750	566	488	218	8,340	3,030
9	1,040	1,110	1,820	2,510	3,030	323	750	518	418	181	6,480	2,680
10	1,740	916	3,030	2,330	3,030	248	859	503	335	172	3,560	2,510
11	2,330	802	3,030	2,080	2,160	210	1,250	488	268	172	2,250	1,180
12	2,250	802	2,850	1,740	2,080	200	750	525	258	172	1,480	699
13	1,650	802	4,820	1,480	12,100	128	653	699	228	164	1,180	607
14	1,480	1,040	8,720	1,180	7,590	87	607	466	195	153	1,040	525
15	1,480	699	15,100	1,250	5,000	112	488	525	164	218	916	525
16	1,320	525	21,400	1,040	8,910	157	431	503	153	209	802	525
17	1,040	802	14,200	859	16,900	323	607	488	98	181	802	566
18	1,040	1,180	7,410	4,100	9,290	525	2,850	431	118	172	699	653
19	12,300	1,650	4,820	3.920	5,920	1,320	9,100	431	607	181	607	566
20	15,300	4,100	8,720	3,030	4,100	1,480	5,740	1,320	607	164	525	488
21	7,970	8,160	11,400	2,080	2,590	1,400	3,030	1,040	418	153	525	451
22	5,740	11,000	13,300	1,900	1,990	1,110	10,400	978	372	134	525	422
23	3,560	7,030	9,480	1,650	1,480	1,400	15,700	978	802	181	510	488
24	2,850	5,370	11,800	1,740	1,110	1,570	5,740	916	3,920	228	488	525
25	2,590	3,920	12,500	1,740	916	1,900	45,300	750	4,280	296	488	566
26	2,510	6,290	6,660	1,400	750	3,210	22,900	653	3,380	312	525	607
27	1,990	19,600	5,000	1,900	566	3,030	6,290	1,040	2,330	488	510	750
28	1,570	12,300	3,740	2,160	495	2,420	3,210	916	1,480	525	451	1,180
29	3,210	5,550	3,560	1,990	473	1,820	2,330	978	1,180	451	451	1,480
30	14,400	....	11,400	2,080	510	1,250	3,030	859	916	397	354	4,640
31	9,480	....	9,100	....	451	....	3,210	699	....	372	....	15,500

NOTE.—Daily discharge determined from a rating curve well defined between 63 and 24,300 second-feet (gage heights 3.0 to 16.0 feet). The open-channel rating curve was applied throughout the year. See footnotes to table of daily gage height.

Monthly discharge of Tygart River at Fetterman, W. Va., for 1912.

[Drainage area, 1,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	15,300	1,040	4,170	3.11	3.58	D.
February	19,600	525	3,970	2.96	3.19	D.
March	21,400	1,110	6,820	5.09	5.87	B.
April	6,110	859	2,610	1.95	2.18	A.
May	16,900	451	3,380	2.52	2.90	A.
June	3,210	87	904	.675	.75	A.
July	45,300	431	5,040	3.76	4.34	B.
August	2,510	431	888	.663	.76	A.
September	4,280	98	1,170	.873	.97	A.
October	802	134	312	.233	.27	B.
November	8.340	218	1,190	.888	.99	A.
December	15,500	312	1,610	1.20	1.38	A.
The year	45,300	87	2.680	2.00	27.18	

NOTE.—See footnote to table of daily discharge.

BUCKHANNON RIVER AT HALL, W. VA.

Location.—At highway bridge at Hall, W. Va.

Records available.—June 7, 1907, to May 25, 1909, when station was discontinued because of backwater from the dam at Boulder. Conditions fully described in Water-Supply Paper 263, pages 48–49.

Gage.—Chain gage attached to bridge; datum unchanged.

Discharge measurements.—On September 3, 1912, the station was visited and the following discharge measurement made by C. T. Bailey: Gage height, 3.60 feet; discharge, 195 second-feet. This measurement indicates backwater.

Flood levels.—On the same date (Sept. 3, 1912) the elevations of the bench marks were checked with a wye level and the elevations of the floods of 1888 and July, 1912, referred to gage datum were determined. The high water of 1888 reached a gage height of about 17.0 feet and that of July, 1912, about 16.0 feet.

WEST FORK RIVER AT ENTERPRISE, W. VA.

Location.—At highway bridge at Enterprise, W. Va., three-fourths mile above the mouth of Bingamon Creek.

Records available.—June 2, 1907, to December 31, 1912.

Drainage area.—750 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation above sea level of the zero of the gage is 869.91 feet.

Channel.—Practically permanent; broken by one pier; smooth, rock bottom.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of 1888 reached a stage of about 33 feet referred to the present gage datum. Maximum gage height recorded since establishment of station, 17.6 feet January 30, 1911.

Winter flow.—Ice may affect the relation of gage height to discharge for two or three weeks at a time during December, January, and February.

Accuracy.—The gage reader stated that during the summer of 1908 the only water running in the river was pumpage from numerous coal mines along the stream; otherwise the records are good.

The following discharge measurement was made by C. T. Bailey:

August 28, 1912: Gage height, 2.22 feet; discharge, 334 second-feet.

Daily gage height, in feet, of West Fork River at Enterprise, W. Va., for 1912.

[C. M. Tetrick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.2	4.3	3.5	5.5	2.75	1.71	1.96	3.05	2.4	2.5	1.60	1.40
2	6.1	3.7	3.2	4.2	2.65	1.66	1.86	2.65	2.3	2.3	1.52	1.40
3	4.3	......	2.9	7.3	2.6	1.61	1.81	2.25	2.2	1.00	1.51	1.38
4	3.7	......	2.7	5.7	2.55	1.47	1.77	1.95	2.15	1.00	1.60	1.80
5	4.0	......	2.4	5.2	2.5	1.46	1.74	1.80	2.0	1.90	1.60	2.06
6	......	......	2.3	4.7	2.35	1.36	1.72	1.70	1.82	1.70	1.55	3.0
7	......	......	2.2	4.0	2.4	1.36	1.71	1.70	1.72	1.64	1.70	5.6
8	......	......	2.1	3.7	2.6	1.26	1.66	1.69	1.70	1.60	3.2	4.5
9	......	......	3.9	3.25	2.55	1.26	1.67	1.69	1.60	1.55	4.2	3.0
10	......	......	3.4	3.05	2.5	1.26	1.85	1.67	1.52	1.50	3.3	2.4
11	......	3.05	3.0	2.9	2.45	1.26	1.80	1.67	1.40	1.50	2.4	2.3
12	......	......	2.7	2.65	2.25	1.26	1.75	1.67	1.40	1.48	2.1	2.1
13	3.45	......	9.9	2.65	2.3	1.18	1.70	1.67	1.42	1.45	2.0	1.90
14	......	......	9.0	2.6	2.15	1.06	1.65	1.66	1.35	1.40	2.0	1.85
15	......	......	11.8	2.6	2.05	0.96	1.73	1.65	1.31	1.40	1.98	1.80
16	......	......	12.2	6.2	2.05	.96	1.55	1.65	1.30	1.30	1.92	1.70
17	......	......	9.0	4.2	3.6	1.46	2.25	1.65	1.30	1.60	1.85	1.70
18	......	......	6.3	3.9	4.2	2.35	1.85	1.85	1.30	1.55	1.80	1.80
19	13.8	......	4.0	3.25	3.7	2.35	1.75	6.6	1.25	1.40	1.80	1.90
20	9.2	......	4.8	2.95	3.45	2.3	3.15	5.0	1.22	1.30	1.75	2.0
21	6.5	7.4	8.9	2.9	3.15	2.2	2.95	3.8	1.21	1.35	1.70	1.95
22	4.0	11.5	7.6	2.65	2.95	2.15	4.0	2.55	2.10	1.30	1.70	1.82
23	4.2	6.2	7.7	2.5	2.75	2.1	6.6	2.15	2.6	1.20	1.65	1.8
24	3.8	4.4	6.5	2.35	2.7	2.55	3.6	2.05	6.6	1.10	1.62	1.76
25	3.6	3.8	9.2	2.2	2.45	2.4	16.6	1.95	5.5	1.90	1.60	1.70
26	3.4	4.0	7.5	2.15	2.25	1.26	8.1	1.90	4.2	1.80	1.56	1.60
27	3.3	12.2	7.2	2.05	2.05	2.2	6.0	2.65	4.6	1.80	1.52	1.80
28	3.0	8.2	6.1	1.97	1.96	2.05	5.4	2.25	4.0	1.75	1.50	3.0
29	2.9	5.3	5.0	1.97	1.96	1.96	4.1	2.1	3.8	1.72	1.48	3.7
30	7.5	......	8.0	2.8	1.88	1.96	3.6	2.0	3.4	1.70	1.42	4.2
31	5.4	......	6.3	......	1.76	......	3.05	1.90	......	1.60	......	6.5

NOTE.—Relation of gage height to discharge affected by ice about Jan. 4–19 and about Feb. 2–20. Observer reported ice 10 inches thick Jan. 13 and 7 inches thick Feb. 11.

Daily discharge, in second-feet, of West Fork River at Enterprise, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,420	1,600	1,030	2,650	566	127	212	737	395	441	99	64
2	3,250	......	829	1,530	514	114	176	514	350	350	83	64
3	1,600	......	649	4,520	489	102	158	328	307	30	81	62
4	......	......	540	2,850	465	74	146	208	286	30	99	155
5	......	......	395	2,360	441	73	136	155	227	190	99	246
6	......	......	350	1,920	372	59	130	124	162	124	89	707
7	......	......	307	1,380	395	59	127	124	130	109	124	2,750
8	......	......	266	1,160	489	48	114	122	124	99	829	1,760
9	......	......	1,300	861	465	48	116	122	99	89	1,530	707
10	......	......	959	737	441	48	172	116	83	79	893	395
11	......	......	707	649	418	48	155	116	64	79	395	350
12	......	......	540	514	328	48	140	116	64	76	266	266
13	......	......	7,550	514	350	42	124	116	67	72	227	190
14	......	......	6,460	489	286	34	112	114	58	64	227	172
15	......	......	9,900	489	246	28	133	112	53	64	220	155
16	......	......	10,400	3,360	246	28	89	112	52	52	197	124
17	......	......	6,460	1,530	1,090	73	328	112	52	99	172	124
18	......	......	3,460	1,300	1,530	372	172	172	52	89	155	155
19	......	......	1,380	861	1,160	372	140	3,780	48	64	155	190
20	6,700	......	2,010	678	992	850	798	2,180	45	52	140	227
21	3,670	4,630	6,320	649	798	307	678	1,230	44	58	124	208
22	1,380	9,520	4,850	514	678	286	1,380	465	266	52	124	162
23	1,530	3,360	4,960	441	566	266	3,780	286	489	43	112	155
24	1,230	1,680	3,670	372	540	465	1,090	246	3,780	36	104	143
25	1,090	1,230	6,700	307	418	395	16,300	208	2,650	190	99	124
26	959	1,380	4,740	286	328	48	5,400	190	1,530	155	91	99
27	893	10,400	4,420	246	246	307	3,150	514	1,840	155	83	155
28	707	5,510	3,250	216	212	246	2,550	328	1,380	140	79	707
29	649	2,460	2,180	216	212	212	1,450	266	1,230	130	76	1,160
30	4,740	......	5,290	593	183	212	1,090	227	959	124	67	1,530
31	2,550	......	3,460	......	143	......	737	190	......	99	......	3,670

NOTE.—Daily discharge determined from a rating curve that is well defined between 0 and 2,180 second-feet (gage heights 0.0 to 5.0 feet) and fairly well defined above 2,270 second-feet (gage height 5.1 feet).

Discharge Jan. 4-19 and Feb. 2-20, estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 4-19, 1,000 second-feet; Feb. 2-20, 850 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of West Fork River at Enterprise, W. Va., for 1912.

[Drainage area, 750 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	1,660	2.21	2.55	D.
February	10,400	....	2,000	2.67	2.88	D.
March	10,400	266	3,400	4.53	5.22	C.
April	4,520	216	1,140	1.52	1.70	A.
May	1,530	143	503	.671	.77	A.
June	465	28	163	.217	.24	A.
July	16,300	89	1,330	1.77	2.04	A.
August	3,780	112	440	.587	.68	A.
September	3,780	44	563	.751	.84	A.
October	441	30	111	.148	.17	A.
November	1,530	67	235	.313	.35	A.
December	3,670	62	548	.731	.84	A.
The year	16,300	....	1,010	1.35	18.28	

NOTE.—See footnotes to table of daily discharge.

ELK CREEK NEAR CLARKSBURG, W. VA.

Location.—At a footbridge about 6 miles above the mouth of the creek and 300 feet above Turkey Run, near Clarksburg, W. Va.

Records available.—October 11, 1910, to December 31, 1912.

Drainage area.—107 square miles (Pittsburgh Flood Commission).

Gage.—Wooden staff gage (during 1912) fastened to a tree near right abutment of footbridge. On November 1, 1913 (before the preparation of this report), a metal gage section (0 to 3 feet) was attached to the old gage, and the gage was then lowered 1.0 foot to avoid negative readings. The elevation above sea level of the zero of the gage is 955.01 feet. See "Accuracy."

Channel.—Rocky and practically permanent. Banks are high and do not overflow.

Discharge measurements.—Made from footbridge at high stages; low-water measurements made by wading at section about 200 feet below bridge.

Floods.—Flood of July, 1912, reached a height of 15 feet on present gage.

Point of zero flow.—Gage height at which flow past the gage will cease is about 0.9 foot, as determined August 30, 1912.

Winter flow.—Records may be affected by ice for short periods in December, January, and February.

Accuracy.—On November 1, 1913 (before the preparation of this report), when the gage was lowered 1.0 foot as noted above, the old gage was found to be inclined a sufficient amount to cause errors in readings taken from the upper portion of the gage. The gage was reset in a vertical position. It is not known how long the gage was in this inclined condition, and no corrections have been applied to gage heights prior to December 31, 1912. All gage heights published in this report refer to the new datum and are therefore 1.0 foot greater than those published in the report of the Pittsburgh Flood Commission.

Cooperation.—This station was established by the Pittsburgh Flood Commission. The station was taken over by the United States Geological Survey on July 1, 1912. Records previous to this date were obtained from the commission.

Discharge measurements of Elk Creek near Clarksburg, W. Va., in 1910–1912.

Date.	Hydrographer.	Gage height.[a]	Discharge.
		Feet.	*Sec.-ft.*
1910. Oct. 11	H. P. Drake[b]	1.48	8.7
1912. Aug. 28	C. T. Bailey	2.25	[c]84

[a] Referred to new datum.
[b] An engineer of the Pittsburgh Flood Commission.
[c] Measurement made by wading at section about 400 feet below the gage.

Daily gage height, in feet, of Elk Creek near Clarksburg, W. Va., for 1910–1912.

[E. H. Smith, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1910.				1910.				1910.			
1	....	1.5	2.3	11	1.5	1.5	2.1	21	1.5	1.4	2.5
2	....	1.6	2.1	12	1.4	1.5	2.1	22	1.7	1.5	2.3
3	....	1.6	2.0	13	1.4	1.5	2.0	23	1.7	1.5	2.1
4	....	1.6	1.9	14	1.4	1.5	1.9	24	1.6	1.5	4.2
5	....	1.6	1.9	15	1.4	1.5	2.1	25	1.5	1.5	3.1
6	....	1.6	2.0	16	1.4	1.5	2.0	26	1.5	1.6	2.6
7	....	1.6	2.3	17	1.4	1.5	1.9	27	1.5	1.6	2.3
8	....	1.5	2.3	18	1.4	1.5	1.9	28	1.5	2.4	2.2
9	....	1.5	2.2	19	1.4	1.5	2.8	29	1.5	3.7	2.4
10	....	1.5	2.2	20	1.4	1.5	2.9	30	1.6	2.7	3.5
								31	1.6	....	3.2

Daily gage height, in feet, of Elk Creek near Clarksburg, W. Va., for 1910–1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	2.8	2.9	2.2	2.9	2.0	1.5	1.4	1.0	3.3	2.2	1.8	2.3
2	3.2	2.8	2.2	2.8	2.3	1.5	1.4	1.0	2.5	4.7	1.8	2.2
3	3.5	2.6	2.1	2.7	2.1	1.5	1.3	1.0	2.1	4.7	1.7	2.1
4	3.4	2.6	2.0	3.8	1.9	1.4	1.3	1.1	2.0	3.0	1.7	2.1
5	2.8	2.6	2.0	4.8	1.9	1.4	1.3	1.1	2.0	2.7	1.7	2.1
6	2.8	2.5	2.1	3.6	1.8	1.4	1.2	1.1	2.0	2.3	1.7	2.0
7	2.5	2.6	2.6	3.2	1.8	1.4	1.2	1.1	2.0	2.8	3.3	2.0
8	2.5	2.5	3.4	3.2	1.7	1.3	1.3	1.1	1.9	4.7	2.6	2.0
9	2.8	2.5	3.8	4.7	1.7	1.3	1.4	1.0	1.9	3.1	2.4	2.0
10	2.5	2.5	3.2	3.4	1.7	1.3	1.4	1.0	2.1	2.7	2.2	1.9
11	2.4	2.3	2.8	2.8	1.7	1.3	1.3	1.0	3.4	3.7	2.0	1.9
12	2.3	2.2	2.6	2.5	1.6	1.3	1.3	.9	2.8	3.1	2.0	1.9
13	6.0	2.2	2.5	2.5	1.6	1.3	1.2	.9	2.5	2.7	2.5	1.9
14	4.7	2.1	2.8	2.4	1.6	1.6	1.2	.9	2.4	2.4	2.3	2.0
15	3.9	2.1	2.7	4.3	1.5	1.6	1.2	.9	6.0	2.7	2.3	2.9
16	3.7	2.0	2.5	3.1	1.5	1.6	1.1	.9	6.2	2.7	2.2	4.4
17	2.9	1.9	2.4	2.8	1.5	1.5	1.1	.9	4.0	2.6	2.1	3.4
18	2.6	2.0	2.4	2.5	1.5	2.7	1.1	.9	2.8	5.2	3.2	2.8
19	2.5	2.5	2.5	2.4	1.5	2.5	1.0	.9	2.4	3.4	3.0	2.4
20	2.4	2.9	3.5	3.0	1.4	2.1	1.0	.9	2.2	2.8	2.6	2.3
21	2.4	3.1	2.8	2.9	1.4	1.8	1.0	.8	2.1	2.5	2.4	2.8
22	3.8	2.9	2.6	2.8	1.4	1.7	1.0	.8	6.3	2.3	2.2	2.7
23	3.3	2.7	2.5	3.4	1.3	1.6	1.0	.8	3.1	2.3	2.1	2.6
24	2.8	2.6	2.3	2.9	2.2	1.6	.9	.8	2.5	2.2	2.3	2.5
25	2.4	2.6	2.2	2.6	1.9	1.5	1.1	.9	2.2	2.2	2.9	2.8
26	2.9	2.5	2.1	2.5	1.7	1.5	1.1	1.0	2.0	2.1	2.7	2.7
27	3.5	2.4	2.1	2.4	1.6	1.4	1.1	1.0	1.9	2.0	2.5	4.8
28	3.9	2.3	2.1	2.2	1.5	1.6	1.1	1.0	2.7	2.0	2.4	3.4
29	3.2	......	2.0	2.1	1.4	1.5	1.1	1.1	2.4	1.9	2.4	2.7
30	3.1	......	2.8	2.1	1.4	1.4	1.0	4.0	2.3	1.9	2.4	2.6
31	3.5	......	3.1	......	1.4	......	1.0	4.9	......	1.8	......	3.5
1912.												
1	3.4	2.8	2.5	2.8	2.3	1.7	1.5	2.5	2.49	2.24	1.52	1.50
2	2.8	2.5	2.3	2.6	2.2	1.7	2.7	2.2	2.30	2.15	1.58	1.50
3	2.5	2.5	2.2	3.6	2.1	1.6	2.0	2.4	2.00	2.00	1.54	1.70
4	2.4	2.4	2.2	2.9	2.0	1.6	1.9	2.1	2.00	1.90	1.52	1.72
5	2.3	2.6	2.2	2.6	1.9	1.5	2.0	1.9	1.90	1.80	1.50	1.72
6	2.3	2.3	2.2	2.5	1.9	1.5	1.8	1.8	1.80	1.70	1.49	3.10
7	2.3	2.2	2.2	2.6	1.9	1.5	1.6	1.7	1.70	1.60	1.60	2.60
8	2.3	2.1	2.3	2.5	1.9	1.5	1.5	1.7	2.90	1.60	3.20	2.40
9	2.7	2.0	2.9	2.4	1.9	1.4	1.5	1.6	2.10	1.59	2.60	2.20
10	2.5	1.9	3.0	2.3	1.8	1.4	1.4	......	1.83	1.58	2.10	2.00
11	2.3	1.9	2.6	2.2	1.8	1.4	1.4	......	1.67	1.58	1.90	1.90
12	2.2	1.9	2.3	2.1	2.1	1.4	1.4	......	1.60	1.57	1.82	1.80
13	2.2	1.9	5.8	2.0	2.5	1.3	1.4	......	1.50	1.59	1.80	1.72
14	2.2	1.8	3.9	1.9	2.3	1.3	1.4	......	1.50	1.60	1.82	1.64
15	2.1	1.8	4.8	1.9	2.2	1.3	1.3	......	1.45	1.60	1.76	1.62
16	2.1	1.8	4.7	1.9	2.3	1.4	1.3	......	1.60	1.59	1.72	1.65
17	2.1	1.8	3.4	1.9	2.8	2.1	1.3	......	1.80	1.65	1.68	1.68
18	2.3	2.2	2.8	2.9	2.7	2.2	1.3	1.5	1.75	1.62	1.64	1.68
19	6.2	2.4	2.6	2.4	2.5	2.1	1.4	1.5	2.38	1.58	1.62	1.80
20	3.3	3.0	3.7	2.2	2.3	1.9	1.4	4.2	1.92	1.60	1.60	1.75
21	2.8	3.1	3.8	2.1	2.1	1.8	2.0	3.2	1.73	1.60	1.59	1.70
22	2.5	5.0	4.3	2.0	2.0	1.7	3.3	2.3	1.60	1.58	1.58	1.64
23	2.5	3.2	3.3	2.0	1.9	1.6	3.0	2.2	2.10	1.87	1.58	1.60
24	2.5	2.7	4.9	1.9	1.8	1.5	2.1	2.1	3.75	1.80	1.57	1.60
25	2.5	2.5	3.9	1.9	1.7	1.5	15.0	1.9	2.95	1.70	1.56	1.60
26	2.6	3.4	3.4	1.8	1.6	1.5	3.2	1.9	2.48	1.75	1.55	1.60
27	2.3	5.0	3.0	2.3	1.5	1.6	2.5	3.0	2.70	1.72	1.54	1.90
28	2.3	3.0	2.6	2.3	1.5	1.6	2.2	2.4	2.38	1.68	1.53	2.80
29	2.5	2.7	3.4	2.2	1.6	1.5	2.0	2.0	2.68	1.65	1.52	2.78
30	3.8	......	3.7	2.2	1.9	1.5	2.3	1.9	2.61	1.62	1.51	3.20
31	3.1	......	3.1	......	1.8	......	2.3	1.8	......	1.56	......	4.30

NOTE.—Daily gage heights Oct. 11, 1910, to Dec. 31, 1911, obtained from the published report of the Pittsburgh Flood Commission. See "Gage," "Accuracy," and "Cooperation" in station description.

BUFFALO CREEK AT BARRACKVILLE, W. VA.

Location.—At iron highway bridge about one-third mile above the covered wooden bridge at Barrackville, W. Va., 2¾ miles from Fairmont, and about 4 miles above mouth of creek.

Records available.[1]—June 3, 1907, to December 31, 1908, when station was discontinued because the creek goes dry in summer.

Estimates of discharge.—For the purpose of obtaining data to make estimates of discharge from the gage-height record June 3, 1907, to December 31, 1908, the station was visited by C. T. Bailey, August 31, 1912, and the following discharge measurement made by wading at a section about 50 feet above the highway bridge: Gage height 0.96 foot; discharge 6.3 second-feet. The sea-level elevation of the zero of the gage was determined by wye levels from Baltimore & Ohio Railroad's permanent bench mark to be 884.40 feet, and the elevation of the bench marks and reference point at the gaging station was checked. The high water of July, 1912, reached a stage of approximately 16 feet referred to the gage datum. Levels on August 31, 1912, indicated that there would be no flow past the gage if the stream were to fall to a stage of 0.6 foot ±0.1 foot, referred to gage datum.

CHEAT RIVER NEAR MORGANTOWN, W. VA.

Location.—At highway bridge at Uneva, W. Va., 7 miles northeast of Morgantown and 10 miles above mouth of river. Parallel of latitude 39° 40′ crosses the river at this bridge.

Records available.—July 8 to December 30, 1899; July 1 to December 29, 1900; August 21, 1902, to December 31, 1905; November 18, 1908, to December 31, 1912.

Drainage area.—1,380 square miles.

Gage.—Standard chain gage attached to bridge.[2]

Channel.—Probably permanent.

Discharge measurements.—Made from upstream side of bridge or, at low water, by wading.

Winter flow.—Ice forms sometimes to a thickness of several inches and large ice jams may affect the relation of gage height to discharge during short periods in December, January, and February.

Accuracy.—This station was not inspected by United States Geological Survey engineers during 1910, 1911, and 1912. On November 3 and 4, 1913 (before the publication of this report), the station was visited by engineers of the Survey, the bench marks and elevation of the zero of the gage were checked with a wye level and two discharge measurements were made. A new discharge curve above 3,620 second-feet has been drawn for 1912. Discharge values above 7,000 second-feet, of which there are relatively few, published in previous reports are in error from 10 to 20 per cent referred to the 1912 rating table, because of what now appears to have been an erroneous extension of the rating curve based upon the discharge measurement made June 9, 1906, the published values being too low by these amounts and the percentage error increasing with the stage. Those using the back records for this station should revise them by means of the rating table here published. For use with gage heights 1902–1909, published in Water-Supply Paper 263, the table must be converted to refer to the second staff gage by using the table of relation of gages published in Water-Supply Paper 263, page 51.

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[1] See Water-Supply Paper 243, pp. 55–56.

[2] See history of this station in Water-Supply Papers 263 and 283.

The new discharge rating table differs from the table used 1902 to 1911 above 3,620 second-feet only, the change being based on 4 discharge measurements made during 1912 and January, 1913 (before the preparation of this report), by H. P. Drake, an engineer of the West Virginia Development Co. of Pittsburgh, Pa. The curve is well defined between discharges 115 and 47,800 second-feet. The two discharge measurements made November 3 and 4, 1913, verify the new curve.

Discharge measurements of Cheat River near Morgantown, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 22	H. P. Drake[a]	8.18	22,800
July 25	.....do	12.27	42,300

[a] An engineer of the West Virginia Development Co. of Pittsburgh, Pa.

Daily gage height, in feet, of Cheat River near Morgantown, W. Va., for 1912.

[C. F. Baker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.7	4.45	4.5	4.9	4.25	2.75	3.85	4.4	3.75	3.7	2.9	2.55
2	5.4	4.1	4.0	4.6	4.15	2.65	3.55	4.2	5.0	3.55	2.9	2.65
3	4.7	3.75	3.9	5.2	3.85	2.6	3.25	3.9	4.4	3.35	2.85	3.2
4	4.35	3.3	3.65	5.1	3.7	2.65	3.8	3.7	3.95	3.2	2.85	3.3
5	4.05	2.95	3.45	4.5	3.5	2.6	4.8	3.3	3.6	3.05	2.75	3.35
6	3.65	3.15	4.4	4.3	3.4	2.5	5.0	3.25	3.35	3.0	2.75	3.5
7	3.3	2.95	3.3	4.05	3.45	2.5	4.1	3.15	3.15	2.9	......	5.0
8	3.1	2.95	3.35	4.05	3.6	2.5	3.55	3.05	3.1	2.8	6.9	4.4
9	3.35	2.65	4.0	4.1	4.15	2.6	3.3	3.0	2.95	2.75	5.4	3.95
10	3.2	......	4.3	3.85	3.85	2.4	3.2	3.05	2.85	2.75	4.5	3.65
11	3.1	2.55	3.95	3.7	3.6	2.35	3.1	3.05	2.7	2.7	4.05	3.45
12	3.05	2.65	3.8	3.6	3.6	2.25	4.0	3.1	2.65	2.6	3.9	3.35
13	3.0	2.75	4.15	3.5	6.2	2.15	3.85	3.0	2.65	2.6	3.65	3.2
14	2.9	2.85	5.0	3.5	5.6	2.15	3.45	2.9	2.65	2.6	3.65	3.15
15	2.9	2.9	7.8	3.5	4.7	2.2	3.3	3.35	2.55	2.55	3.6	3.2
16	2.85	......	9.3	3.45	6.0	2.5	4.0	3.2	2.6	2.5	3.5	3.15
17	2.8	2.7	6.3	3.85	7.5	3.0	4.5	3.1	2.65	2.45	3.35	3.1
18	2.95	2.75	5.4	4.6	5.7	3.65	4.5	2.9	3.25	2.45	3.25	3.0
19	......	3.05	5.0	4.8	5.0	4.4	7.2	3.05	3.3	2.45	3.2	3.05
20	5.6	3.95	6.1	4.25	4.45	4.3	5.0	3.95	3.2	2.5	3.1	3.15
21	4.7	9.2	9.4	3.95	4.05	4.05	4.9	3.95	2.9	2.45	3.05	3.1
22	4.15	8.8	8.3	3.75	3.8	3.6	7.7	3.6	2.8	2.6	2.95	3.1
23	4.0	6.6	6.2	3.7	3.55	3.65	6.0	3.6	3.3	2.65	2.9	2.85
24	4.0	5.5	7.1	3.7	3.4	3.9	8.7	3.35	6.1	2.85	2.9	......
25	3.85	4.2	7.0	3.6	3.35	3.7	12.0	3.2	6.2	3.95	2.9	2.8
26	3.65	5.7	5.8	3.45	3.1	3.9	7.2	3.25	5.3	3.9	2.85	2.8
27	3.65	9.9	5.0	4.2	3.0	3.65	5.3	3.25	5.4	3.65	2.8	2.85
28	3.4	6.6	4.5	4.35	2.95	3.5	4.5	3.4	4.5	3.45	2.7	3.1
29	3.45	5.2	5.0	4.1	2.9	3.5	4.3	3.6	4.1	3.25	2.65	3.25
30	5.7	......	6.9	4.2	3.05	4.8	6.2	4.15	3.9	3.1	2.6	4.05
31	5.1	......	5.7	......	2.9	......	4.9	3.85	......	3.0	......	6.9

NOTE.—Relation of gage height to discharge probably not materially affected by ice during 1912. The observer reported ice averaging from 1 to 8 inches in thickness Jan. 4–19 and from 1 to 6 inches from Feb. 4–21, but the river was entirely frozen over only on Jan. 17 and 18 and the control was reported open at all times. The ice went out Jan. 19 and during the night of Feb. 21.

Daily discharge, in second-feet, of Cheat River near Morgantown, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	15,700	4,510	4,700	6,500	3,790	668	2,580	4,320	2,320	2,200	805	512
2	9,040	3,300	3,000	5,110	3,460	585	1,840	3,620	7,000	1,840	805	585
3	5,550	2,320	2,710	8,020	2,580	545	1,260	2,710	4,320	1,430	758	1,180
4	4,140	1,340	2,080	7,510	2,200	585	2,450	2,200	2,860	1,180	758	1,340
5	3,150	860	1,620	4,700	1,730	545	6,020	1,340	1,960	980	668	1,430
6	2,080	1,120	4,320	3,960	1,520	480	7,000	1,260	1,430	915	668	1,730
7	1,340	860	1,340	3,150	1,620	480	3,300	1,120	1,120	805	[a]8,680	7,000
8	1,040	860	1,430	3,150	1,960	480	1,840	980	1,040	710	16,700	4,320
9	1,430	585	3,000	3,300	3,460	545	1,340	915	860	668	9,040	2,860
10	1,180	548[a]	3,960	2,580	2,580	425	1,180	980	758	668	4,700	2,080
11	1,040	512	2,860	2,200	1,960	400	1,040	980	625	625	3,150	1,620
12	980	585	2,450	1,960	1,960	352	3,000	1,040	585	545	2,710	1,430
13	915	668	3,460	1,730	13,100	310	2,580	915	585	545	2,080	1,180
14	805	758	7,000	1,730	10,100	310	1,620	805	585	545	2,080	1,120
15	805	805	21,300	1,730	5,550	330	1,340	1,430	512	512	1,960	1,180
16	758	[a]715	28,900	1,620	12,100	480	3,000	1,180	545	480	1,730	1,120
17	710	625	13,600	2,580	19,800	915	4,700	1,040	585	452	1,430	1,040
18	860	668	9,040	5,110	10,600	2,080	4,700	805	1,260	452	1,260	915
19	[a]5,480	980	7,000	6,020	7,000	4,320	18,200	980	1,340	452	1,180	980
20	10,100	2,860	12,600	3,790	4,510	3,960	7,000	2,860	1,180	480	1,040	1,120
21	5,550	28,400	29,400	2,860	3,150	3,150	6,500	2,860	805	452	980	1,040
22	3,460	26,400	23,800	2,320	2,450	1,960	20,800	1,960	710	545	860	1,040
23	3,000	15,200	13,100	2,200	1,840	2,080	12,100	1,960	1,340	585	805	758
24	3,000	9,550	17,700	2,200	1,520	2,710	25,900	1,430	12,600	758	805	[a]734
25	2,580	3,620	17,200	1,960	1,430	2,200	42,700	1,180	13,100	2,860	805	710
26	2,080	10,600	11,100	1,620	1,040	2,710	18,200	1,260	8,530	2,710	758	710
27	2,080	32,000	7,000	3,620	915	2,080	8,530	1,260	9,040	2,080	710	758
28	1,520	15,200	4,700	4,140	860	1,730	4,700	1,520	4,700	1,620	625	1,040
29	1,620	8,020	7,000	3,300	805	1,730	3,960	1,960	3,300	1,260	585	1,260
30	10,600		16,700	3,620	980	6,020	13,100	3,460	2,710	1,040	545	3,150
31	7,510		10,600		805		6,500	2,580		915		16,700

[a] Interpolated.

NOTE.—See "Accuracy" in station description.

Monthly discharge of Cheat River near Morgantown, W. Va., for 1912.

[Drainage area, 1,380 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	15,700	710	3,550	2.57	2.96	C.
February	32,000	512	6,020	4.36	4.70	C.
March	29,400	1,340	9,510	6.89	7.94	A.
April	8,020	1,620	3,480	2.52	2.81	A.
May	19,800	805	4,110	2.98	3.44	A.
June	6,020	310	1,510	1.09	1.22	A.
July	42,700	1,040	7,710	5.59	6.44	A.
August	4,320	805	1,710	1.24	1.43	A.
September	13,100	512	2,940	2.13	2.38	A.
October	2,860	452	1,010	.732	.84	B.
November	16,700	545	2,320	1.68	1.87	A.
December	16,700	512	2,020	1.46	1.68	A.
The year	42,700	310	3,820	2.77	37.71	

NOTE.—See "Accuracy" in station description.

Rating table for Cheat River at chain gage near Morgantown, W. Va., for 1912.[a]

Gage height.	Discharge.	Difference.	Gage height.	Discharge.	Difference.	Gage height.	Discharge.	Difference.	Gage height.	Discharge.	Difference.
Feet.	*Sec.-feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Sec.-feet.*
1.50	115	25	3.80	2,450	260	6.10	12,610	510	8.40	24,340	510
1.60	140	25	3.90	2,710	290	6.20	13,120	510	8.50	24,850	510
1.70	165	25	4.00	3,000	300	6.30	13,630	510	8.60	25,360	510
1.80	190	30	4.10	3,300	320	6.40	14,140	510	8.70	25,870	510
1.90	220	35	4.20	[a]3,620	340	6.50	14,650	510	8.80	26,380	510
2.00	255	35	4.30	3,960	360	6.60	15,160	510	8.90	26,890	510
2.10	290	40	4.40	4,320	380	6.70	15,670	510	9.00	27,400	510
2.20	330	45	4.50	4,700	410	6.80	16,180	510	9.10	27,910	510
2.30	375	50	4.60	5,110	440	6.90	16,690	510	9.20	28,420	510
2.40	425	55	4.70	5,550	470	7.00	17,200	510	9.30	28,930	510
2.50	480	65	4.80	6,020	480	7.10	17,710	510	9.40	29,440	510
2.60	545	80	4.90	6,500	500	7.20	18,220	510	9.50	29,950	510
2.70	625	85	5.00	7,000	510	7.30	18,730	510	9.60	30,460	510
2.80	710	95	5.10	7,510	510	7.40	19,240	510	9.70	30,970	510
2.90	805	110	5.20	8,020	510	7.50	19,750	510	9.80	31,480	510
3.00	915	130	5.30	8,530	510	7.60	20,260	510	9.90	31,990	510
3.10	1,045	140	5.40	9,040	510	7.70	20,770	510	10.00	32,500	5,100
3.20	1,185	155	5.50	9,550	510	7.80	21,280	510	11.00	37,600	5,100
3.30	1,340	180	5.60	10,060	510	7.90	21,790	510	12.00	42,700	5,100
3.40	1,520	210	5.70	10,570	510	8.00	22,300	510	13.00	47,800	5,100
3.50	1,730	225	5.80	11,080	510	8.10	22,810	510	14.00	52,900	5,100
3.60	1,955	245	5.90	11,590	510	8.20	23,320	510	15.00	58,000	....
3.70	2,200	250	6.00	12,100	510	8.30	23,830	510			

[a] Below gage height 4.2 feet this table is the same as the 1910-11 table. This table applies to all years, 1902-1912, with proper change of gage heights, 1902-1909 by curve of relation as explained in Water-Supply Paper 263, pp. 51-62, and Water-Supply Paper 283, pp. 50-53. See "Accuracy."

NOTE.—The above table is not applicable for periods during which ice existed or the channel was obstructed. It is based on 21 discharge measurements made during 1902-1913 and the curve is well defined between gage heights 1.5 and 13.0 feet. Above gage height 5.0 feet the rating curve is a tangent, the difference being 510 per tenth.

Use this table to three significant figures only.

SHAVERS FORK RIVER AT PARSONS, W. VA.

Location.—At steel highway bridge 600 feet northwest of the railroad station at Parson, W. Va., one-third mile above its confluence with Dry Fork.

Records available.—October 14, 1910, to December 31, 1912. Established October 14, 1910, as a Pittsburgh Flood Commission station and was maintained by them until taken over by the United States Geological Survey July 1, 1912.

Drainage area.—210 square miles. (Pittsburgh Flood Commission.)

Gage.—Standard chain gage attached to bridge. Datum unchanged. The elevation above sea level of the zero of the gage is 1,631.70 feet.

Channel.—Rocky; probably permanent.

Discharge measurements.—Made from downstream side of bridge or, at low stages, by wading.

Floods.—High waters of 1888 and 1907 reached a height of approximately 12.5 feet referred to the present gage datum.

Point of zero flow.—Levels run September 4, 1912, indicate that there would be no flow past the gage were the river to fall to a stage of 1.8 feet ±0.2 foot.

Winter flow.—Affected by ice during severe winters.

Accuracy.—Most of the discharge measurements at this station were made by the subsurface method and the coefficients used in computing them vary from 0.88 to 0.95; measurements made this way are not considered by the Survey engineers to be as accurate as those made by the six-tenths or two-tenths and eight-tenths methods. Estimates of daily and monthly discharge are withheld from publication for the present because values computed from data now available appear to be excessive. The gage-height record is not thoroughly reliable as noted in the footnote to the table of daily gage height. Anyone using these data should do so with caution and should compare any estimates of discharge made with those for other gaging stations in the locality and with records of precipitation.

Discharge measurements of Shavers Fork River at Parsons, W. Va., in 1910–1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*	1912.		*Feet.*	*Sec.-ft.*
Oct. 14	H. P. Drake[a]	2.89	76	July 20	H. P. Drake[a]	4.41	[b]1,110
				20	.....do	4.37	1,070
1911.				22	.....do	8.02	[b]7,740
Oct. 13	H. P. Drake[a]	4.22	958	Aug. 22	.....do	3.32	[b]196
Dec. 12	.....do	3.40	[b]312	22	.....do	3.32	[b]195
				Sept. 4	C. T. Bailey	3.05	117
				Dec. 24	H. P. Drake[a]	3.18	[b]144

[a] An engineer of the Pittsburgh Flood Commission.
[b] Velocity determined by subsurface method and coefficient used to reduce subsurface to mean velocity.

Daily gage height, in feet, of Shavers Fork River at Parsons, W. Va., for 1910–1912.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1910.				1910.				1910.			
1	....	2.97	4.54	11	....	2.97	3.14	21	2.89	2.77	2.94
2	....	2.97	3.54	12	....	2.97	3.14	22	2.89	2.87	3.04
3	....	3.07	3.54	13	....	2.97	3.14	23	3.10	2.87	3.14
4	....	2.97	3.74	14	2.89	2.77	2.94	24	3.20	2.87	3.74
5	....	2.97	3.54	15	2.89	2.97	2.94	25	3.00	2.97	3.74
6	....	3.07	3.24	16	2.80	2.97	2.94	26	3.00	3.77	3.54
7	....	2.97	3.24	17	2.89	2.77	2.94	27	3.00	3.57	3.24
8	....	2.97	3.14	18	2.89	2.87	2.94	28	3.00	3.67	3.24
9	....	2.97	2.94	19	2.80	2.87	3.14	29	3.03	4.87	3.84
10	....	2.97	3.04	20	2.89	2.87	3.04	30	3.01	3.97	5.94
								31	3.00	....	4.84

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	3.90	5.78	3.06	3.94	3.62	3.60	3.38	2.76	4.64	5.72	3.20	3.90
2	4.50	4.48	3.26	4.44	3.62	3.60	3.08	2.76	3.74	5.12	3.40	3.90
3	5.90	4.18	3.26	4.54	3.42	3.60	2.78	2.96	3.54	4.72	3.30	3.80
4	5.30	4.08	3.26	4.64	3.52	3.40	2.78	2.86	3.44	4.72	3.20	3.70
5	4.70	3.88	3.26	6.24	3.62	3.40	2.78	2.76	3.34	4.62	3.10	3.80
6	3.90	3.88	3.36	5.64	3.52	3.60	2.78	2.66	3.34	4.32	4.20	3.60
7	3.70	3.78	4.56	5.64	3.42	3.80	2.68	1.86	3.14	4.72	5.50	3.40
8	3.60	3.68	4.46	5.44	3.52	4.00	2.78	2.56	3.24	5.32	4.20	3.50
9	3.50	3.88	2.96	5.24	3.42	3.90	2.78	2.66	2.94	4.72	4.00	3.40
10	3.20	3.78	4.16	5.04	3.32	3.80	2.68	2.56	2.74	4.92	3.90	3.30
11	3.20	3.68	4.06	4.84	3.02	3.90	2.88	2.46	3.74	5.02	3.80	3.20
12	3.50	3.78	3.96	4.64	3.12	3.80	3.38	2.46	4.34	3.82	3.60	3.30
13	7.20	3.48	4.46	4.84	3.02	3.80	3.18	2.36	3.74	4.22	3.50	3.40
14	6.50	3.48	4.96	5.04	3.12	4.00	3.08	2.46	3.74	3.90	3.40	3.50
15	5.50	3.38	5.26	5.64	3.22	3.90	2.98	2.56	2.84	4.10	3.40	3.60
16	5.60	3.38	5.06	4.74	2.92	3.80	2.98	2.66	6.74	4.70	3.50	4.00
17	4.50	3.48	3.96	4.44	3.02	3.70	2.98	2.66	5.44	4.00	3.40	4.60
18	4.10	3.58	3.86	4.44	2.92	4.40	2.78	2.56	4.34	7.40	....	4.20
19	3.90	3.48	4.06	4.04	2.82	4.00	2.88	2.56	3.74	5.00	....	4.30
20	3.80	3.68	4.66	4.64	2.82	4.00	2.68	2.56	3.94	4.60	....	4.20
21	3.60	3.58	4.46	4.84	2.92	3.80	2.78	2.66	4.04	4.20	....	4.10
22	4.50	3.48	4.36	5.04	2.82	3.80	2.78	2.66	3.94	4.50	....	3.70
23	4.50	3.20	4.06	4.84	1.92	3.70	2.98	2.86	3.84	4.60	....	4.00
24	4.40	3.28	3.96	4.24	2.62	3.80	2.88	2.66	3.74	4.40	3.70	4.20
25	4.60	3.08	3.86	4.04	2.62	4.00	2.78	2.86	3.74	4.00	3.60	4.60
26	4.80	3.28	3.56	4.14	2.72	3.80	2.78	2.56	3.84	4.00	3.50	5.00
27	5.70	3.28	3.46	4.04	4.22	4.00	2.78	2.46	3.94	3.50	3.60	5.10
28	5.60	3.18	3.46	3.84	4.02	3.80	2.68	2.66	4.04	3.40	3.40	5.00
29	5.30	....	3.66	4.04	3.82	3.70	2.58	2.86	3.94	3.30	3.30	4.90
30	9.90	....	3.86	3.64	3.72	3.40	2.68	2.96	3.74	3.40	3.40	4.60
31	5.90	....	4.06	....	3.72	....	2.88	6.36	....	3.30	....	5.00

Daily gage height, in feet, of Shavers Fork River at Parsons, W. Va., for 1910–1912—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.												
1	5.4	4.2	5.4	5.0	3.2	3.0	3.4	4.1	3.4	3.30	3.23	2.87
2	5.0	4.1	5.4	5.1	3.1	3.1	3.3	3.2	3.3	3.22	3.08	2.97
3	4.9	3.6	5.2	4.9	3.2	3.0	3.3	3.3	3.2	3.25	3.00	3.07
4	4.6	3.2	5.0	4.6	3.2	3.1	4.8	3.3	3.01	3.02	2.83	3.02
5	4.3	3.2	4.8	4.5	3.1	3.0	4.4	3.2	3.02	3.10	2.70	3.07
6	4.0	3.0	4.7	4.6	3.4	2.1	4.3	3.1	3.01	3.05	2.88	3.87
7	4.0	3.0	5.0	4.2	3.5	3.1	4.2	3.2	2.81	3.00	3.03	3.72
8	3.6	3.1	5.2	4.1	3.4	3.0	3.1	3.2	2.81	3.10	6.2	3.87
9	......	3.0	5.3	4.0	3.3	2.1	3.6	3.2	2.72	2.95	6.0	3.77
10	......	3.1	5.4	4.2	4.0	2.8	3.3	3.1	2.10	2.92	4.18	3.72
11	......	3.2	5.2	4.1	3.8	2.8	3.3	3.0	2.01	2.85	3.98	3.57
12	......	3.3	5.3	3.6	7.0	2.8	3.3	3.0	2.02	2.75	3.73	3.47
13	......	3.2	4.6	3.4	6.3	2.6	3.5	3.1	2.03	3.00	3.78	3.42
14	......	3.1	4.8	3.5	6.0	2.8	3.4	3.0	2.02	3.10	3.93	3.12
15	......	3.0	5.3	3.4	5.8	2.8	4.2	3.0	2.82	2.85	3.78	3.02
16	......	3.1	7.3	3.3	6.1	2.8	4.0	3.1	3.00	2.90	3.73	3.17
17	......	3.0	......	3.6	5.9	2.9	4.0	3.0	3.02	2.80	3.58	3.07
18	......	3.2	......	3.5	5.0	4.4	6.3	2.9	3.01	2.92	3.68	3.17
19	......	3.5	......	4.0	4.6	4.5	6.0	3.0	2.90	3.10	3.63	3.12
20	5.2	3.7	......	4.0	4.0	4.6	4.4	3.1	3.02	2.95	3.48	3.07
21	5.3	3.8	......	3.8	3.7	3.1	4.0	3.3	3.00	2.80	3.38	3.02
22	5.0	3.9	6.1	3.7	3.7	3.9	7.6	3.2	3.00	2.95	3.40	2.97
23	5.1	4.3	5.7	3.6	3.6	4.0	6.6	3.6	3.22	3.02	3.33	2.77
24	5.0	4.4	4.8	3.4	3.5	4.0	5.0	3.4	4.80	3.45	3.30	2.87
25	4.9	4.6	4.7	3.5	3.4	3.0	8.0	3.2	5.00	3.60	3.38	......
26	4.8	6.1	4.7	3.6	3.2	3.1	4.2	3.4	4.05	3.55	3.33	......
27	4.6	7.4	4.6	3.4	3.4	3.9	4.4	3.6	4.05	3.50	3.18	3.27
28	4.5	6.5	5.0	3.5	3.1	3.7	4.0	3.4	3.82	2.95	3.28	3.17
29	4.8	5.6	5.2	3.6	3.2	3.9	3.9	3.3	3.55	2.83	3.12	3.07
30	5.1	......	6.0	3.5	3.1	3.6	4.2	3.3	3.42	3.30	2.87	5.15
31	4.8	......	5.0	......	3.1	......	4.1	3.4	......	3.25	......	5.25

NOTE.—Gage heights Oct. 14, 1910, to Dec. 31, 1911, obtained from published report of the Pittsburgh Flood Commission. Gage heights for May 23, Aug. 7, 1911; June 6, 9, 21, and Sept. 10–14, 1912, appear to be 1.0 foot too low as result of errors in observations. Gage heights Mar. 9, 17, 18, Sept. 15, Oct. 12, 1911; June 25, 26, and July 8, 1912, may also be 1 foot too low. Gage heights at other times, such as Nov. 29, 1910, and Nov. 7, 1911, may be 1.0 foot too high. Two errors of a foot each during the fourth quarter of 1912 were found by correspondence with the observer. It appears, therefore, that this gage-height record is not thoroughly reliable.

Relation of gage height to discharge probably affected by ice about Dec. 3–23, 1910; Jan. 7–19, Feb. 5–20, and Dec. 25–31, 1912. During 1912 the observer reported river frozen over Jan. 9–19 and Dec. 25–26, "ice going out" Dec. 30, and "ice backing up" Dec. 31.

YOUGHIOGHENY RIVER AT CONFLUENCE, PA.

Location.—At highway bridge about half a mile from the railroad station at Confluence, Pa., and about half a mile above the mouth of Casselman River.

Records available.—September 15, 1904, to December 31, 1912.

Drainage area.—435 square miles.

Gage.—Chain gage attached to bridge; datum unchanged since established.

Channel.—Probably permanent.

Discharge measurements.—Made from upstream side of bridge.

Winter flow.—Relation of gage height to discharge is occasionally affected by ice.

Accuracy.—Discharge measurements made during 1911 and 1912 indicate marked effect from backwater at this station, and estimates of discharge are withheld until this effect can be more fully investigated. For a statement of general conditions at this station see Water Supply Papers 263 and 283.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which supplied all records for 1912.

The following discharge measurement was made by R. A. Boehringer, an engineer of the Water Supply Commission of Pennsylvania:

December 4, 1912: Gage height, 2.50 feet; discharge, 414 second-feet.

Daily gage height, in feet, of Youghiogheny River at Confluence, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.80	4.30	4.00	4.50	4.05	2.30	4.15	3.39	2.98	3.12	2.16	2.01
2	4.80	4.20	3.70	4.30	3.90	2.20	3.85	3.04	4.83	2.92	2.16	2.06
3	4.05	4.20	3.50	4.20	3.70	2.10	3.70	2.84	5.43	2.77	2.11	2.56
4	3.70	4.15	3.25	4.10	3.65	2.00	3.65	2.69	4.73	2.62	2.11	2.46
5	3.40	4.10	3.10	3.85	3.45	2.05	3.90	2.59	4.33	2.52	2.06	2.41
6	3.15	4.05	3.00	3.85	3.35	1.95	3.50	2.49	4.03	2.42	2.06	3.80
7	3.00	4.00	3.00	3.70	3.30	1.95	3.05	2.44	3.83	2.32	3.61	3.90
8	2.95	3.70	3.20	3.60	3.10	1.95	2.80	2.39	3.53	2.22	5.16	3.40
9	2.95	3.50	3.90	3.50	3.10	1.90	2.65	2.29	3.33	2.12	4.01	3.15
10	3.05	3.40	3.40	3.30	3.05	1.95	2.65	2.44	3.13	2.12	3.31	2.95
11	3.70	3.30	3.30	3.30	2.95	1.85	3.00	2.34	2.83	2.12	3.06	2.70
12	3.45	3.25	3.35	3.20	2.95	1.85	4.20	2.24	2.63	2.12	2.96	2.50
13	3.15	3.20	3.20	3.10	2.85	1.80	3.20	2.19	2.48	2.12	2.86	2.35
14	3.15	3.20	3.10	3.00	2.85	1.80	2.80	2.24	2.33	2.07	2.96	[a]2.35
15	3.20	3.20	[b]11.32	2.90	2.80	1.95	2.60	2.44	2.23	2.07	2.81	2.40
16	3.15	3.15	9.55	2.95	8.25	4.95	3.45	2.39	2.23	2.07	2.71	2.40
17	[c]3.70	3.10	6.10	2.90	6.10	3.95	3.75	2.34	2.23	2.02	2.61	2.40
18	3.85	3.20	5.50	3.70	4.95	3.05	3.55	2.34	2.23	2.02	2.56	2.50
19	7.25	3.35	5.30	3.90	4.80	2.65	3.35	2.34	2.18	2.02	2.46	2.80
20	7.60	4.95	7.15	3.50	4.45	2.50	3.15	3.24	2.18	1.97	2.41	3.00
21	6.25	5.85	15.30	3.40	4.20	2.35	4.40	2.69	2.18	1.97	2.36	2.90
22	5.75	5.80	10.25	3.20	4.05	2.26	6.35	2.69	2.23	1.97	2.31	2.80
23	5.15	5.60	6.50	3.10	3.85	2.30	4.15	2.64	3.68	2.32	2.26	2.85
24	5.15	5.40	7.50	3.00	3.60	2.50	14.95	2.59	6.93	2.72	2.21	2.50
25	5.15	5.20	6.60	2.90	3.35	2.55	10.65	2.54	5.03	2.72	2.16	2.25
26	4.65	12.85	5.50	2.90	3.10	2.75	6.20	2.49	4.33	2.82	2.11	2.00
27	4.20	9.60	5.20	3.10	3.00	2.65	4.85	2.44	5.23	2.67	2.11	2.10
28	3.85	6.00	4.90	4.30	2.75	2.50	4.05	2.44	4.43	2.52	2.06	2.40
29	4.05	4.60	5.85	4.00	2.70	2.55	3.75	2.89	3.83	2.37	2.01	2.65
30	4.20	....	5.10	4.40	2.50	4.70	4.80	3.09	3.43	2.27	2.01	4.50
31	4.35	....	4.80	....	2.45	....	3.70	2.94	....	2.17	....	5.70

[a] Ice formed along banks.
[b] Maximum 11.75 feet during night of Mar. 15.
[c] Ice gorge at Casselman River, causing backwater.

CASSELMAN RIVER AT CONFLUENCE, PA.

Location.—At highway bridge about 500 yards from the railroad station and a few hundred yards above the junction of Casselman and Youghiogheny rivers.

Records available.—September 15, 1904, to December 31, 1912.

Drainage area.—450 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from upstream side of bridge.

Winter flow.—Relation of gage height to discharge is affected by ice at times.

Accuracy.—Estimates of discharge are withheld for the present. For a discussion of the general conditions at this station see Water Supply Papers 263 and 283.

Cooperation.—Station maintained by the Water Supply Commission of Pennsylvania, which furnished all records for 1912.

The following discharge measurement was made by R. A. Boehringer, an engineer of the Water Supply Commission of Pennsylvania:

December 4, 1912: Gage height, 2.48 feet; discharge, 429 second-feet.

Daily gage height, in feet, of Casselmen River at Confluence, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.89	6.20	3.20	3.85	4.00	2.30	3.25	2.60	3.00	3.80	2.20	2.10
2	4.04	6.00	2.90	3.70	3.85	2.20	2.90	2.50	4.50	3.50	2.20	2.20
3	3.64	5.60	2.75	3.55	3.70	2.10	2.80	2.40	7.20	3.10	2.15	2.60
4	3.34	5.30	2.65	3.45	3.60	2.00	2.70	2.35	4.70	2.90	2.15	2.40
5	3.04	5.10	2.60	3.30	3.50	2.00	2.70	2.30	4.10	2.70	2.15	2.40
6	2.84	4.90	2.55	3.20	3.40	1.95	3.05	2.25	3.90	2.60	2.10	3.25
7	2.64	4.80	2.50	3.10	3.30	1.95	2.75	2.25	3.80	2.50	4.10	3.10
8	2.54	5.00	2.60	3.00	3.10	1.95	2.55	2.20	3.55	2.40	4.35	2.80
9	2.49	5.40	3.20	2.90	3.00	1.90	2.40	2.10	3.40	2.30	3.40	2.55
10	2.44	5.20	2.85	2.85	2.95	1.90	2.35	2.30	3.25	2.30	3.20	2.40
11	2.54	5.10	2.60	2.80	2.90	1.85	2.50	2.20	2.95	2.30	3.00	2.30
12	2.54	5.00	2.60	2.75	2.85	1.85	2.40	2.15	2.75	2.25	2.80	2.20
13	2.59	4.90	2.55	2.70	2.85	1.80	2.30	2.10	2.65	2.25	2.70	2.15
14	2.59	4.90	2.50	2.65	2.80	1.80	2.20	2.20	2.55	2.20	2.90	[a]2.25
15	2.74	4.90	10.50	2.65	2.80	2.20	2.10	2.55	2.50	2.20	2.75	2.40
16	2.94	4.80	8.75	2.60	7.80	6.20	4.00	2.45	2.45	2.15	2.65	2.40
17	3.74	4.80	5.10	2.60	5.00	3.20	3.20	2.40	2.45	2.15	2.60	2.35
18	3.94	4.90	4.90	3.70	4.10	2.80	3.00	2.50	2.45	2.10	2.55	2.35
19	[b]8.89	5.30	4.75	3.30	3.90	2.70	2.80	2.60	2.40	2.10	2.50	2.65
20	8.94	6.85	7.00	3.00	3.75	2.60	2.70	4.50	2.40	2.05	2.45	2.60
21	7.94	7.10	17.00	2.75	3.60	2.50	4.40	3.65	2.35	2.05	2.40	2.40
22	7.54	7.00	9.60	2.75	3.50	2.45	6.00	3.55	2.40	2.05	2.35	2.25
23	[c]5.74	6.80	5.65	2.75	3.40	2.40	3.80	3.45	3.50	3.20	2.25	2.15
24	4.74	6.70	7.00	2.70	3.20	2.45	12.75	3.35	6.85	2.75	2.25	2.10
25	4.74	6.70	5.60	2.70	3.10	2.40	9.15	3.30	4.70	2.70	2.20	2.10
26	4.74	13.10	4.90	2.65	2.95	2.50	4.85	3.25	4.30	2.60	2.20	2.20
27	[d]5.14	9.90	4.70	2.70	2.80	2.35	3.70	3.20	5.30	2.55	2.15	2.20
28	6.54	4.85	4.60	3.60	2.60	2.25	3.20	3.15	4.80	2.45	2.15	2.30
29	7.34	3.60	5.60	3.30	2.60	2.40	3.10	3.45	4.40	2.35	2.10	2.35
30	6.74	....	5.05	4.60	2.50	4.20	3.10	3.30	4.10	2.25	2.10	3.35
31	6.34	....	4.05	....	2.40	....	2.75	3.10	....	2.20	....	4.70

[a] Ice along shores.
[b] Ice went out about 11 a. m. and gorged below the confluence, causing backwater.
[c] Channel open through gorge.
[d] Channel frozen and starting to gorge.

LAUREL HILL CREEK AT CONFLUENCE, PA.

Location.—At highway bridge about one-fourth mile from the railroad station and only a few hundred yards above the junction of the creek with Youghiogheny River.

Records available.—September 15, 1904, to December 31, 1912.

Drainage area.—126 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Shifts as result of refuse dumped into the creek from a tannery a short distance above the bridge.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice may affect the relation of gage height to discharge during short periods.

Accuracy.—Relation of gage height to discharge is affected by backwater from the Youghiogheny and by shift of channel at bridge. As a result the records of flow at this station are not so good as at the other two stations at Confluence. Estimates of discharge are withheld for the present. For a discussion of general conditions at this station, see Water Supply Papers 263 and 283.

Cooperation.—This station is now maintained by the Water Supply Commission of Pennsylvania, which furnished the records for 1912.

The following discharge measurement was made by R. A. Boehringer, an engineer of the Water Supply Commission of Pennsylvania:

December 4, 1912: Gage height, 2.17 feet; discharge, 147 second-feet.

Daily gage height, in feet, of Laurel Hill Creek at Confluence, Pa., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.80	2.90	3.10	3.15	3.55	2.09	2.83	2.41	2.80	2.88	2.27	1.87
2	3.30	2.80	2.80	3.15	3.40	2.04	2.43	2.31	4.40	2.68	2.27	1.97
3	3.05	2.80	2.70	3.05	3.30	1.94	2.43	2.21	6.65	2.53	2.22	2.32
4	2.90	2.75	2.55	3.00	3.20	1.89	2.33	2.11	4.40	2.43	2.17	2.02
5	2.70	2.70	2.45	2.90	3.20	1.89	2.63	2.01	4.00	2.38	2.12	2.20
6	2.60	2.65	2.45	2.85	3.05	1.84	2.48	1.96	3.70	2.28	2.12	3.00
7	2.50	2.65	2.40	2.85	2.95	1.84	2.33	1.96	3.60	2.23	3.27	2.80
8	2.50	2.65	2.50	2.75	2.90	1.84	2.23	1.91	3.40	2.13	3.47	2.55
9	2.45	2.60	3.10	2.80	2.85	1.79	2.18	1.91	3.20	2.03	2.83	2.40
10	2.40	2.60	2.65	2.70	2.85	1.79	2.13	1.91	3.05	2.03	2.72	2.30
11	2.20	2.60	2.50	2.70	2.75	1.74	2.23	1.91	2.70	2.03	2.62	2.15
12	2.20	2.55	2.60	2.70	2.70	1.74	2.13	1.86	2.60	2.03	2.52	2.05
13	2.20	2.55	2.50	2.65	2.70	1.74	2.03	1.86	2.50	2.03	2.42	1.95
14	2.10	2.55	2.50	2.65	2.65	1.74	1.98	2.11	2.40	1.98	2.57	[a]2.15
15	2.10	2.55	3.00	2.60	2.70	1.94	1.93[a]	2.51	2.30	1.98	2.42	2.30
16	2.10	2.55	7.05	2.55	6.75	4.94	3.28	2.31	2.30	1.98	2.32	2.20
17	2.20	2.55	4.10	2.60	4.65	3.04	2.93	2.11	2.30	1.93	2.27	2.10
18	2.65	2.65	4.00	3.35	3.55	2.64	2.73	2.31	2.25	1.93	2.22	2.10
19	[b]4.30	2.80	3.80	3.10	3.40	2.54	2.53	2.51	2.25	1.88	2.22	2.60
20	5.00	3.65	5.15	2.85	3.30	2.44	2.53	3.66	2.25	1.88	2.17	2.40
21	4.00	3.65	14.40	2.70	3.15	2.39	3.93	3.56	2.25	1.83	2.12	2.25
22	3.45	3.60	7.20	2.75	3.05	2.44	4.63	3.41	2.40	1.83	2.12	2.15
23	3.20	3.30	4.15	2.70	3.00	2.34	3.13	3.31	5.15	3.23	2.07	2.05
24	3.20	3.15	5.00	2.70	2.90	2.19	9.93	3.21	5.80	2.93	2.07	2.05
25	3.15	3.10	4.20	2.65	2.85	2.14	6.18	3.11	4.25	2.88	2.02	2.00
26	3.15	9.25	3.80	2.60	2.65	2.29	3.58	3.01	4.00	2.83	2.02	2.00
27	3.10	9.55	3.50	2.70	2.45	2.24	3.13	2.91	4.90	2.73	1.97	2.00
28	3.10	4.00	3.40	3.45	2.35	2.19	2.93	2.91	3.80	2.63	1.92	2.05
29	3.00	3.50	4.05	3.20	2.25	2.29	2.83	3.21	3.30	2.53	1.92	2.20
30	3.00	....	3.55	3.95	2.20	3.19	2.83	2.91	3.00	2.43	1.92	4.25
31	3.00	....	3.40	....	2.20	....	2.53	2.81	....	2.33	....	3.55

[a] Ice along shores. [b] Backwater from ice gorge on Casselman River.

MUSKINGUM RIVER BASIN.

MUSKINGUM RIVER AT ZANESVILLE, OHIO.

Location.—At lower pool at Lock No. 10, Zanesville, Ohio, and 4,000 feet below the mouth of Licking River.

Records available.—June 4, 1887, to December 31, 1912. The United States Geological Survey began making measurements at this station in March, 1905.

Drainage area.—5,820 square miles.

Gage.—Staff gage in lower pool at Lock No. 10; datum probably unchanged since established.

Channel.—The crest of the dam at Lock No. 9, 9 miles below Lock No. 10, acts as a point of control for the gage. As the dams on the Muskingum are fixed dams, the relation between gage height and discharge would be permanent, and once determined would apply indefinitely if conditions at the dams remained unchanged. See notes under "Accuracy."

Discharge measurements.—Made from upstream side of Sixth Street Bridge, 1,000 feet above Lock No. 10.

Floods.—The maximum flood gage height, according to the United States Weather Bureau, was 36.8 feet March 24, 1898.

Point of zero flow.—The crest of dam No. 9 acts as a point of control except as the water may be drawn off by openings in the lock or leakage through the dam. The elevation of the crest is 7.0 feet, referred to gage datum.

Winter flow.—The relation of gage height to discharge is sometimes affected during the winter months by ice cover and occasionally by ice jams.

Artificial control.—The operation of two power plants at Dam No. 9 modifies the flow past the lower gage at Dam No. 10 to an unknown extent.

Accuracy.—Investigations and studies made during 1912 show that the records at this station are practically worthless as a means of making accurate determinations of discharge, because of leakage through Dam No. 9 prior to 1907 and the operation of the two power plants at Dam No. 9. All estimates of discharge previously published for this station should therefore be used with great caution, as they are in error an unknown amount; the lower the flow the greater the possible error.

Cooperation.—Gage readings are furnished by the United States Engineer Corps.

Discharge measurements of Muskingum River at Zanesville, Ohio, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 5	P. S. Monk	20.64	39,000	May 4	C. T. Bailey	12.9	13,900
8	.....do	15.48	19,900	24	.....do	8.82	3,570
May 2	C. T. Bailey	15.9	22,300				

Daily gage height, in feet, of Muskingum River at Zanesville, Ohio, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	15.8	13.8	15.0	21.6	16.6	9.3	8.4	9.5	9.7	8.4	8.4	8.0
2	15.3	13.2	12.5	21.1	15.9	9.0	8.7	9.0	9.0	8.4	8.4	8.0
3	14.0	12.5	11.4	22.8	14.4	8.8	8.5	8.8	9.4	8.2	8.3	8.0
4	12.4	12.1	10.8	21.6	12.6	8.7	8.7	8.6	10.8	8.2	8.3	8.1
5	11.0	11.4	10.2	20.6	11.2	8.7	8.6	8.5	11.2	8.1	8.3	8.2
6	10.0	10.9	9.8	18.6	10.8	8.6	8.6	8.4	10.4	8.1	8.2	8.7
7	9.9	10.6	9.5	15.8	10.4	8.4	8.4	8.3	10.0	8.1	8.2	9.0
8	9.7	10.4	9.8	15.4	10.2	8.4	8.4	8.3	10.2	8.0	8.7	10.6
9	9.6	10.2	11.0	14.6	10.0	8.3	8.2	8.6	9.8	8.0	8.8	9.8
10	9.6	10.0	10.8	13.8	9.8	8.3	8.4	9.8	9.5	8.0	9.0	9.0
11	9.5	9.9	10.6	12.6	9.5	8.2	8.5	9.8	9.2	8.0	8.8	8.6
12	9.5	9.8	10.2	11.8	9.7	8.2	8.6	9.9	8.8	8.1	8.5	8.4
13	9.4	9.4	10.9	11.2	10.0	8.2	8.6	9.8	8.6	8.1	8.4	8.2
14	9.4	9.2	11.2	11.2	10.0	8.2	8.5	9.5	8.6	8.0	8.4	8.2
15	9.4	9.2	16.4	12.2	9.8	8.2	8.6	9.1	8.6	8.0	8.3	8.4
16	9.4	9.6	19.3	13.9	10.2	8.5	8.5	8.8	8.8	7.9	8.3	8.2
17	9.3	10.0	17.8	14.5	11.6	15.2	9.1	8.6	8.8	7.9	8.2	8.2
18	9.9	10.5	17.2	14.1	11.2	14.6	8.7	8.5	8.9	7.9	8.2	8.1
19	15.4	11.8	16.2	14.2	10.6	13.5	8.4	8.4	8.9	8.0	8.2	8.1
20	17.6	18.8	15.4	13.8	10.0	11.4	8.8	8.6	9.1	8.1	8.2	8.1
21	17.7	18.6	16.6	12.4	9.6	10.3	9.2	8.6	8.8	8.4	8.2	8.2
22	17.7	16.7	18.4	11.4	9.2	9.7	10.2	9.0	8.5	8.4	8.2	8.2
23	16.7	15.8	16.8	10.8	9.0	9.4	12.4	8.8	8.5	8.8	8.2	8.1
24	15.7	15.2	17.7	10.4	8.9	9.1	11.8	8.6	9.3	9.8	8.1	8.1
25	14.2	15.1	19.2	10.1	8.8	8.9	11.0	8.7	10.1	11.6	8.0	8.1
26	13.8	18.8	18.0	9.9	8.7	8.8	11.1	8.6	9.8	10.4	8.0	8.0
27	13.2	22.4	17.8	10.5	8.6	8.7	11.0	8.5	9.2	9.4	8.0	8.0
28	12.1	20.4	18.3	10.2	8.5	8.6	10.2	9.0	9.0	9.0	8.0	8.0
29	11.6	18.1	20.0	11.8	8.8	8.5	9.4	9.0	8.6	8.6	8.0	7.9
30	14.0	....	22.2	15.2	9.6	8.5	9.4	8.8	8.6	8.6	8.0	8.4
31	13.8	....	22.6	....	9.6	....	10.0	9.5	....	8.5	....	9.6

NOTE.—Daily gage heights are means of two readings per day furnished by United States Engineer Corps and therefore differ from those published by the United States Weather Bureau, which represent one reading each day. Relation of gage height to discharge probably affected by ice during a part of January and February.

MOHICAN RIVER BASIN.

MOHICAN RIVER AT POMERENE, OHIO.

Location.—At highway bridge at Pomerene, Ohio, 4 miles from Walhonding, Ohio, and 5 miles below the mouth of Owl Creek.

Records available.—December 1, 1910, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Coarse gravel; apparently permanent.

Discharge measurements.—Made from upstream side of bridge.

Winter flow.—The relation of gage height to discharge is sometimes affected by ice cover and ice gorges during the winter months.

Diversions.—A feeder for the Ohio Canal formerly took water from the river at Cavallo, some distance above Pomerene, but this feeder has not been in use for some time.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:

May 6, 1912: Gage height, 4.40 feet; discharge, 1,470 second-feet. This discharge measurement indicates a change in the relation of gage height to discharge.

Daily gage height, in feet, of Mohican River at Pomerene, Ohio, for 1912.

[F. L. Rodehaver. observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.1	5.0	5.9	8.5	6.5	4.6	3.65	4.5	4.1	3.47	3.65	2.83
2	6.2	4.6	5.5	10.0	5.4	4.6	3.6	3.8	3.96	3.41	4.0	3.34
3	5.8	4.4	5.1	9.0	4.9	4.0	4.05	3.65	3.9	3.16	3.85	3.85
4	5.3	4.0	4.8	8.4	4.8	3.55	3.85	3.4	3.44	3.02	3.8	3.85
5	5.2	......	4.5	7.4	4.6	3.55	3.85	3.37	3.25	2.97	3.75	3.85
6	5.2	......	3.9	6.3	4.4	3.55	3.8	3.30	4.05	2.95	3.65	4.35
7	[a] 5.4	......	3.8	7.0	4.3	3.5	3.75	3.27	3.75	2.96	4.05	4.8
8	[a] 5.5	......	4.0	6.4	4.2	3.43	3.34	3.27	3.6	2.98	3.95	4.6
9	5.2	......	5.1	5.9	4.05	3.22	3.43	3.25	3.6	3.25	3.85	4.15
10	[a] 4.8	......	5.1	5.6	3.9	3.18	3.43	3.37	3.35	3.26	3.85	3.75
11	[a] 4.6	3.85	4.4	5.4	3.85	3.13	3.75	3.5	3.04	3.21	3.8	3.6
12	[a] 4.4	......	4.4	5.3	4.05	3.12	3.95	4.05	2.85	3.22	3.75	3.55
13	[a] 4.3	......	5.1	5.2	4.4	3.10	4.6	3.95	2.81	3.20	3.65	3.55
14	......	......	5.0	5.8	4.45	3.12	4.5	3.65	2.98	3.19	3.65	3.47
15	......	......	10.9	6.9	4.05	3.20	4.45	3.6	3.8	2.93	3.6	3.43
16	4.0	......	8.8	7.0	4.2	5.6	5.4	3.55	4.05	2.88	3.38	3.39
17	......	3.6	6.8	6.9	5.3	10.2	4.9	3.45	4.0	2.86	3.21	3.37
18	......	4.15	6.1	7.4	5.1	7.4	5.4	3.32	3.85	2.86	3.12	3.33
19	9.3	5.4	5.9	6.5	4.8	6.1	5.0	3.22	3.85	3.47	3.09	3.31
20	6.4	8.2	5.7	5.5	4.7	5.2	4.3	3.17	3.8	3.45	3.06	3.25
21	6.3	5.6	7.8	4.9	4.6	4.9	4.8	3.15	3.5	3.41	3.03	3.15
22	5.8	6.0	7.1	4.6	4.4	4.8	4.8	3.14	3.65	3.27	2.97	3.11
23	5.4	6.3	6.6	4.6	4.35	4.7	4.9	3.27	4.05	3.22	2.96	3.30
24	4.8	6.6	7.8	4.4	4.0	4.35	4.5	3.34	3.95	4.8	2.94	3.31
25	4.6	6.1	6.8	4.3	3.6	3.9	6.4	3.30	3.65	4.8	2.92	3.28
26	4.4	11.2	5.8	3.9	3.5	3.65	5.5	3.27	3.75	4.8	2.90	3.25
27	4.2	7.4	5.3	4.3	3.49	3.6	5.3	3.23	3.85	4.6	2.90	3.20
28	4.4	6.9	6.6	4.2	3.47	3.55	4.8	3.22	3.65	4.2	2.88	3.17
29	4.8	6.6	11.1	4.2	4.25	3.55	4.8	3.65	3.65	3.85	2.87	3.13
30	5.4	......	12.4	7.4	4.8	3.5	4.6	3.95	3.6	3.65	2.86	3.39
31	5.8	......	9.2	......	4.7	......	5.3	4.3	......	3.46	......	4.4

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19 and about Feb. 2–20. The observer reported as follows: "Jan. 7 and 8, river frozen over and holds water back. Jan. 9–16, river entirely frozen over. Jan. 8–16, control frozen over; ice from 3 to 9 inches thick. Jan. 19, ice breaking up and running out. Jan. 20, ice gone. Feb. 4–17, river at gage and control frozen over, ice from 2 to 11 inches thick. Feb. 17, thawing. Feb. 19, raining; ice beginning to back up. Feb. 20, raining; ice gorge holding water back. Feb. 21, raining; ice all gone.

KANAWHA RIVER BASIN.

SOUTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

Location.—About 1.6 miles above the confluence of North and South forks of New River and about 4 miles from Crumpler, N. C.

Records available.—August 12, 1908, to December 31, 1912.

Drainage area.—325 square miles.

Gage.—Standard chain gage attached to trees on left bank; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat at a section about half a mile below the gage or by wading at a section about 500 feet below the gage.

Winter flow.—Ice usually does not form in sufficient quantity to cause backwater at the gage.

Accuracy.—The gage-height record is considered very reliable. Sufficient data have not been obtained to permit estimates of discharge to be made. This gaging station was not visited by engineers of the Geological Survey during 1912, but on December 16, 1913, the station was visited and the elevations of bench marks and zero of gage were checked with a wye level and a discharge measurement was made.

Daily gage height, in feet, of South Fork of New River near Crumpler, N. C., for 1912.

[J. J. Garvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	1.48	1.65	2.0	1.7	1.48	1.40	1.48	1.10	1.35	1.17	1.28
2	1.7	1.42	1.6	2.25	1.65	1.55	1.42	1.40	1.10	1.31	1.20	1.30
3	1.55	1.44	1.65	2.15	1.6	1.6	1.55	1.36	1.10	1.28	1.18	1.30
4	1.43	1.34	1.6	1.95	1.55	1.65	1.48	1.40	1.09	1.24	1.16	1.28
5	1.38	1.36	1.65	1.85	1.6	1.5	1.6	1.42	1.06	1.22	1.15	1.32
6	1.30	1.7	1.7	1.8	1.65	1.65	1.85	1.40	1.12	1.20	1.14	1.38
7	2.05	1.65	1.7	1.8	1.6	1.7	1.65	1.34	1.23	1.20	1.95	1.44
8	2.0	1.75	1.8	1.8	1.55	1.6	1.5	1.30	1.48	1.18	2.25	1.35
9	2.1	1.6	1.85	1.75	1.49	1.5	1.48	1.46	1.39	1.18	1.65	1.28
10	2.0	1.55	1.75	1.7	1.47	1.44	1.5	1.48	1.23	1.15	1.45	1.26
11	2.0	1.6	1.7	1.65	1.5	1.41	1.55	1.44	1.08	1.14	1.36	1.21
12	1.9	1.46	1.75	1.65	2.7	1.39	2.0	1.34	1.10	1.14	1.32	1.18
13	1.8	1.55	2.0	1.65	2.5	1.38	1.75	1.30	1.22	1.14	1.30	1.31
14	1.65	1.49	2.0	1.6	2.05	1.55	1.7	1.28	1.32	1.29	1.39	1.28
15	1.75	1.36	3.0	1.6	1.9	1.7	1.7	1.28	1.34	1.40	1.34	1.22
16	1.75	1.47	3.1	1.6	2.2	1.75	1.55	1.32	1.30	1.36	1.30	1.34
17	1.8	1.55	2.6	1.6	2.4	1.55	1.55	1.28	1.28	1.26	1.26	1.24
18	1.95	1.48	2.15	1.7	2.05	1.46	1.6	1.28	1.22	1.18	1.22	1.20
19	2.15	1.38	2.0	1.55	1.85	1.35	1.9	1.27	1.19	1.22	1.21	1.22
20	2.15	1.41	1.9	1.55	1.75	1.30	2.15	1.34	1.26	1.25	1.20	1.21
21	2.05	1.85	1.8	1.5	1.7	1.30	1.95	1.36	1.18	1.24	1.18	1.19
22	1.9	2.9	1.75	1.75	1.65	1.30	1.8	1.29	1.13	1.30	1.18	1.19
23	1.8	1.95	1.7	1.8	1.6	1.33	1.7	1.24	2.05	1.37	1.18	1.24
24	1.8	1.85	2.0	1.7	1.6	1.32	1.6	1.18	2.3	1.34	1.18	1.25
25	1.7	1.8	2.1	1.6	1.55	1.95	1.6	1.17	1.7	1.26	1.18	1.20
26	1.5	1.9	1.9	1.55	1.55	1.65	1.6	1.17	1.5	1.20	1.18	1.38
27	1.44	2.15	1.8	1.75	1.5	1.55	1.5	1.17	1.7	1.18	1.14	1.5
28	1.30	2.0	1.75	1.7	1.5	1.5	1.43	1.14	1.6	1.15	1.24	1.38
29	1.49	1.85	2.7	1.7	1.8	1.42	1.4	1.14	1.5	1.15	1.42	1.40
30	1.75	....	2.5	1.75	1.6	1.5	1.85	1.12	1.37	1.15	1.37	1.7
31	1.65	....	2.1	....	1.55	....	1.65	1.11	....	1.14	....	1.7

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19 and about Feb. 3–16. Observer made full notes relative to ice, reporting the river frozen over Jan. 6–19 with ice from 4 to 12 inches thick. Ice began to break up Jan. 19 and was all gone Jan. 29. Ice formed again Feb. 3 and remained until about Feb. 17, thickness varying from 4 to 5 inches.

NEW RIVER NEAR GRAYSON, VA.

Location.—At Norfolk & Western Railway bridge at Fries Junction, 1 mile from Grayson, Va., immediately above the mouth of Chestnut Creek.

Records available.—August 7, 1908, to December 31, 1912. Station was discontinued January 4, 1913, because of backwater from the Appalachian Power Co.'s dam No. 2.

Drainage area.—1,160 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Irregular but practically permanent. The river at the measuring section is wide, with an irregular, rocky bottom; current rough and rapid.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Gage heights are little, if any, affected by ice.

Artificial control.—The operation of a large cotton mill, run by water power, about 4 miles above the gage, affects the flow of the river during low water.

Accuracy.—The characteristics noted under "Channel" made this a rather poor station, but with careful work accurate discharge measurements can be made. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by Bailey and Carr:

September 25, 1912: Gage height, 4.62 feet; discharge, 3,070 second-feet.

Daily gage height, in feet, of New River near Grayson, Va., for 1912.

[Oscar Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.5	4.4	4.45	4.9	4.45	4.05	4.2	4.05	3.66	3.82	3.60	3.69
2	4.35	4.25	4.35	5.1	4.4	4.0	4.0	3.96	3.66	3.80	3.67	3.82
3	4.3	4.05	4.2	5.6	4.35	4.2	4.05	3.86	3.62	3.72	3.67	3.78
4	4.15	3.78	4.25	5.3	4.2	4.2	....	3.93	3.60	3.75	3.65	3.85
5	3.89	3.81	4.3	4.8	4.2	4.1	4.4	4.0	3.63	3.71	3.61	3.92
6	3.77	3.94	4.4	4.65	4.25	4.05	4.9	3.90	3.66	3.68	3.78	3.88
7	3.68	4.1	4.35	4.6	4.25	4.15	4.6	3.83	3.62	3.67	4.0	3.90
8	4.3	4.1	4.55	4.6	4.25	4.05	4.35	3.79	3.74	3.74	4.5	3.86
9	4.4	4.05	4.75	4.45	4.15	4.0	4.1	3.82	4.0	3.65	4.3	3.81
10	4.35	4.05	4.8	4.35	4.1	3.93	4.1	3.92	3.80	3.68	3.99	3.72
11	4.35	4.05	4.65	4.3	4.1	3.89	4.15	3.98	3.67	3.62	3.86	3.70
12	4.25	3.94	4.6	4.25	5.5	3.86	4.35	3.88	3.60	3.62	3.86	3.75
13	4.35	3.79	4.85	4.25	5.1	3.82	4.4	3.8	3.98	3.65	3.85	3.60
14	4.3	3.96	4.95	4.2	4.7	3.90	4.3	3.78	3.78	3.68	3.84	3.78
15	4.65	3.9	6.0	4.2	4.5	4.1	4.2	3.77	3.72	3.79	3.88	3.66
16	4.5	3.87	7.0	4.2	4.9	4.2	4.1	3.76	3.75	3.87	3.80	3.72
17	4.25	3.98	5.8	4.25	5.4	4.05	3.99	3.78	3.68	3.76	3.71	3.88
18	4.2	3.98	5.2	4.25	4.9	3.96	4.05	3.74	3.75	3.69	3.76	3.73
19	4.25	4.1	4.85	4.2	4.6	3.92	4.2	3.74	3.98	3.72	3.68	3.71
20	4.35	4.1	4.75	4.1	4.45	3.84	4.4	3.78	3.94	3.75	3.67	3.76
21	4.55	4.4	4.6	4.1	4.35	3.81	4.35	4.55	3.74	3.76	3.56	3.65
22	4.4	5.8	4.5	4.2	4.3	3.79	4.2	4.1	3.67	3.76	3.70	3.60
23	4.2	5.0	4.4	4.5	4.2	3.86	4.1	3.94	4.15	3.79	3.68	3.68
24	4.05	4.6	4.6	4.4	4.2	3.84	4.0	3.83	5.3	3.78	3.64	3.58
25	4.1	4.65	5.2	4.2	4.1	4.5	3.98	3.78	4.7	3.75	3.56	3.65
26	4.05	4.8	4.9	4.15	4.1	4.4	4.1	3.75	4.2	3.69	3.61	3.65
27	4.05	5.4	4.65	4.2	4.05	4.3	3.98	3.84	4.1	3.67	3.77	3.84
28	4.05	5.1	4.6	4.4	4.15	4.0	3.86	3.74	4.15	3.65	3.65	3.85
29	4.1	4.7	5.1	4.4	4.25	4.1	3.83	3.68	4.1	3.65	3.59	3.75
30	4.9	....	5.9	4.5	4.3	4.4	4.25	3.68	3.96	3.64	3.61	4.0
31	4.8	....	5.2	....	4.15	....	4.2	3.69	....	3.60	....	[a] 5.9

[a] Observer reported backwater from Appalachian Power Co.'s dam below gaging station.

NOTE.—Observer made no notes relative to ice in the river, simply reporting "snow and ice" Jan. 8 and "sleet and rain" Jan. 29. Relation of gage height to discharge probably affected by ice about Jan. 6-19 and about Feb. 5-17.

NEW RIVER AT RADFORD, VA.

Location.—At toll highway bridge near the Norfolk & Western Railway station at Radford, Va., 1½ miles below Norfolk & Western Railway bridge and 6 miles below the mouth of Little River.

Records available.—August 1, 1898, to July 15, 1906; May 6, 1907, to December 31, 1912.

Drainage area.—2,720 square miles.

Gage.—Standard chain gage attached to bridge. The United States Weather Bureau gage was originally used at this point, but owing to its inaccessibility it was replaced by a wire gage referred to the same datum February 23, 1900. On December 1, 1903, the wire gage was replaced by a chain gage and the datum lowered 3.41 feet to avoid negative readings.

Channel.—Practically permanent.

Discharge measurements.—Made from the downstream side of the highway bridge.

Floods.—Maximum gage height, according to United States Weather Bureau, was 37.4 feet September 15, 1879.

Point of zero flow.—A determination by leveling July 17, 1911, indicates that there would be no flow past the gage if the river stage were to fall to 1.0 foot±0.3 foot.

Winter flow.—The relation of gage height to discharge is only occasionally affected by ice.

Artificial control.—Power plants about 50 miles above station may affect flow to a small extent.

Accuracy.—A good discharge rating curve for this station has been obtained as a result of numerous discharge measurements. No discharge measurements were made at this station during 1912. Five discharge measurements made during 1913 indicate a change in the rating curve such that the new curve will give results about 6 per cent smaller than the curve used in this report.

Daily gage height, in feet, of New River at Radford, Va., for 1912.

[R. B. Harvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.5	4.2	4.8	5.5	4.7	4.1	4.15	3.75	3.31	3.6	3.34	3.34
2	4.5	4.3	4.45	5.6	4.6	3.9	4.15	3.65	3.23	3.55	3.34	3.20
3	4.3	4.05	....	6.7	4.4	4.0	3.9	3.5	3.41	3.55	3.38	3.65
4	4.2	3.6	....	5.9	4.25	4.2	4.05	4.2	3.27	3.55	3.12	3.6
5	3.8	3.46	....	5.3	4.2	4.0	4.3	4.2	3.23	3.40	3.45	3.6
6	3.29	3.65	....	5.0	4.25	3.9	5.0	4.4	3.19	3.38	3.37	3.85
7	3.30	3.8	....	4.9	4.3	3.9	4.5	4.6	3.18	3.38	3.5	3.7
8	3.55	3.95	....	4.9	4.3	3.9	4.20	4.7	3.39	3.47	4.5	3.65
9	3.8	3.95	....	4.7	4.2	3.8	3.95	4.25	3.49	3.42	4.35	3.6
10	4.0	3.8	5.3	4.6	4.1	3.75	3.95	3.85	3.55	3.36	4.05	3.55
11	4.05	3.8	5.1	4.5	4.05	3.75	4.0	3.65	3.42	3.28	3.7	3.46
12	4.0	3.8	4.9	4.4	9.2	3.7	4.15	3.75	3.33	3.29	3.65	3.42
13	4.0	3.65	6.0	4.3	6.8	3.65	4.15	3.45	3.29	3.28	3.6	3.5
14	3.85	3.8	5.9	4.25	5.4	3.65	4.05	3.45	3.37	3.41	3.55	3.55
15	3.85	3.75	7.6	4.25	5.0	3.85	3.95	3.5	3.39	3.6	3.65	3.55
16	4.0	3.65	9.6	4.25	6.3	3.95	3.85	3.6	3.31	3.6	3.7	3.26
17	3.95	3.65	6.8	4.25	6.9	4.0	3.7	3.7	3.45	3.42	3.55	3.55
18	3.65	3.85	5.9	4.35	5.6	3.8	3.7	3.55	3.65	3.42	3.28	3.55
19	3.95	3.9	5.3	4.25	5.2	3.85	3.95	3.48	3.75	3.5	3.6	3.49
20	4.35	4.05	5.0	4.15	4.8	3.7	3.9	3.42	3.85	3.42	3.6	3.36
21	4.35	4.2	4.9	4.1	4.6	3.6	3.95	3.43	3.6	3.18	3.48	3.42
22	4.35	7.3	4.7	4.45	4.45	3.55	3.95	3.7	3.39	3.5	3.30	3.47
23	4.05	5.7	4.6	4.45	4.35	3.65	3.75	3.65	4.15	3.49	3.32	3.28
24	4.0	4.9	4.8	4.4	4.25	3.9	3.65	3.5	6.1	3.38	3.38	3.55
25	3.95	5.1	5.7	4.3	4.15	4.1	3.65	3.39	5.3	3.49	3.38	3.28
26	3.95	5.2	5.5	4.1	4.1	4.5	3.6	3.37	4.8	3.45	3.38	3.20
27	3.95	6.5	5.1	4.1	4.05	4.25	3.7	3.37	4.05	3.45	3.55	3.20
28	3.9	5.7	4.8	4.15	4.05	4.5	3.6	3.44	3.95	3.36	3.40	3.31
29	3.95	5.1	8.5	4.35	4.2	3.9	3.44	3.30	3.95	3.38	3.32	3.6
30	4.8	....	7.5	4.8	4.25	3.95	3.42	3.37	3.75	3.42	3.44	3.39
31	5.3	....	6.1	....	4.2	....	3.44	3.38	....	3.41	....	3.8

NOTE.—Observer made no report relative to ice. Relation of gage height to discharge probably affected by ice about Jan. 7-20 and about Feb. 6-13. Gage-height record Mar. 3-9 lost in fire at toll house.

Daily discharge, in second-feet, of New River at Radford, Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
·1	4,930	3,890	6,020	8,750	5,650	3,560	3,720	2,490	1,380	2,080	1,450	1,450
2	4,930	4,230	4,760	9,150	5,290	2,930	3,720	2,220	1,210	1,950	1,450	1,150
3	4,230	3,400	4,600	13,800	4,580	3,240	2,930	1,820	1,600	1,950	1,540	2,220
4	3,890	2,080	4,200	10,400	4,060	3,890	3,400	3,890	1,300	1,950	998	2,080
5	2,630	1,720	4,200	7,950	3,890	3,240	4,230	3,890	1,210	1,580	1,700	2,080
6	1,340	....	6,000	6,780	4,060	2,930	6,780	4,580	1,130	1,540	1,510	2,780
7	....	....	5,300	6,400	4,230	2,930	4,930	5,290	1,110	1,540	1,820	2,350
8	....	....	4,900	6,400	4,230	2,930	3,890	5,650	1,560	1,750	4,930	2,220
9	....	....	7,200	5,650	3,890	2,630	3,080	4,060	1,800	1,630	4,400	2,080
10	....	....	7,950	5,290	3,560	2,490	3,080	2,780	1,950	1,490	3,400	1,950
11	....	....	7,170	4,930	3,400	2,490	3,240	2,220	1,630	1,320	2,350	1,720
12	....	....	6,400	4,580	25,400	2,350	3,720	2,490	1,430	1,340	2,220	1,630
13	....	....	10,800	4,230	14,200	2,220	3,720	1,700	1,340	1,320	2,080	1,820
14	....	2,630	10,400	4,060	8,350	2,220	3,400	1,700	1,510	1,600	1,950	1,950
15	....	2,490	17,800	4,060	6,780	2,780	3,080	1,820	1,560	2,080	2,220	1,950
16	....	2,220	27,300	4,060	12,100	3,080	2,780	2,080	1,380	2,080	2,350	1,280
17	....	2,220	14,200	4,060	14,700	3,240	2,350	2,350	1,700	1,630	1,950	1,950
18	....	2,780	10,400	4,400	9,150	2,630	2,350	1,950	2,220	1,630	1,820	1,950
19	....	2,930	7,950	4,060	7,560	2,780	3,080	1,770	2,490	1,820	2,080	1,800
20	....	3,400	6,780	3,720	6,020	2,350	2,930	1,630	2,780	1,630	2,080	1,490
21	4,400	3,890	6,400	3,560	5,290	2,080	3,080	1,650	2,080	1,110	1,770	1,630
22	4,400	16,400	5,650	4,760	4,760	1,950	3,080	2,350	1,560	1,820	1,360	1,750
23	3,400	9,560	5,290	4,760	4,400	2,220	2,490	2,220	3,720	1,800	1,400	1,320
24	3,240	6,400	6,020	4,580	4,060	2,930	2,220	1,820	11,200	1,540	1,540	1,950
25	3,080	7,170	9,560	4,230	3,720	3,560	2,220	1,560	7,950	1,800	1,540	1,320
26	3,080	7,560	8,750	3,560	3,560	4,930	2,080	1,510	6,020	1,700	1,540	1,150
27	3,080	12,900	7,170	3,560	3,400	4,060	2,350	1,510	3,400	1,700	1,950	1,150
28	2,930	9,560	6,020	3,720	3,400	4,930	2,080	1,680	3,080	1,490	1,580	1,380
29	3,080	7,170	22,000	4,400	3,890	2,930	1,680	1,360	3,080	1,540	1,400	2,080
30	6,020	....	17,400	6,020	4,060	3,080	1,630	1,510	2,490	1,630	1,680	1,560
31	7,950	....	11,200	....	3,890	....	1,680	1,540	....	1,600	....	2,630

NOTE.—Daily discharge computed from a rating curve well defined between 800 and 17,000 second-feet. Above 20,000 second-feet the curve is based on flood-discharge comparisons with records at Hinton, Kanawha Falls, and Charleston, W. Va. See "Accuracy."

Discharge Jan. 7–20 and Feb. 6–13 estimated, because of ice, from climatologic records, as follows: Jan. 7–20, 1,500 second-feet; Feb. 6–13, 1,800 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Daily discharge Mar. 3–9 estimated from Weather Bureau gage readings.

Monthly discharge of New River at Radford, Va., for 1912.

[Drainage area, 2,720 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	7,950	....	2,830	1.04	1.20	D.
February	16,400	....	4,450	1.64	1.77	C.
March	27,300	4,200	9,030	3.32	3.83	C.
April	13,800	3,560	5,530	2.03	2.26	B.
May	25,400	3,400	6,310	2.32	2.68	C.
June	4,930	1,950	2,990	1.10	1.23	B.
July	6,780	1,630	3,060	1.12	1.25	B.
August	5,650	1,360	2,420	.890	1.03	B.
September	11,200	1,110	2,560	.941	1.05	B.
October	2,080	1,110	1,670	.614	.70	B.
November	4,930	998	1,990	.732	.82	B.
December	2,780	1,150	1,800	.662	.76	B.
The year	27,300	....	3,720	1.37	18.63	

NOTE.—See footnotes to table of daily discharge.

NEW RIVER AT FAYETTE, W. VA.

Location.—At highway bridge connecting Fayette and South Fayette, W. Va., 850 feet above the mouth of Wolf Creek.

Records available.—July 29, 1895, to May 22, 1901; August 11, 1902, to December 31, 1904; July 16, 1908, to December 31, 1912.

Drainage area.—6,800 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation of the zero of the gage is 838.44 feet above sea level.

Channel.—Rock bed strewn with large bowlders which cause boils and eddies at high stages.

Discharge measurements.—Made from upstream side of bridge.

Floods.—The flood of 1878 reached a height of about 53 feet by the present gage datum.

Winter flow.—The relation of gage height to discharge is little if at all affected by ice.

Accuracy.—Errors have entered into many of the gage readings prior to 1908, particularly before the chain gage was installed, November 20, 1903, the original wire gage being frequently many tenths in error. Owing to this cause and to the difficulty in making accurate measurements, all estimates of discharge heretofore published are only fair. Estimates of discharge for 1912 are withheld from publication for the present.

Discharge measurements of New River at Fayette, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 26	C. T. Bailey	13.15	35,100
Sept. 10	.....do	0.48	2,070

Daily gage height, in feet, of New River at Fayette, W. Va., for 1912.

[C. J. Henry, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.6	8.9	8.6	12.2	8.4	3.7	7.0	2.1	1.4	2.5	0.7	0.8
2	8.6	7.4	7.8	15.0	7.8	3.5	5.2	1.9	1.4	2.2	.5	.9
3	8.0	5.9	8.0	17.8	6.7	3.1	5.2	2.2	1.5	1.6	.5	1.0
4	6.6	3.6	9.0	14.9	6.0	2.9	4.8	2.0	1.5	1.5	.5	1.0
5	5.3	3.0	8.2	11.2	5.4	3.1	4.7	1.9	1.5	1.4	.6	1.7
6	4.1	2.6	4.7	9.3	5.2	3.1	6.3	1.9	1.4	1.3	.6	2.0
7	2.6	2.9	5.0	8.2	5.8	2.9	6.5	2.2	1.3	1.4	1.3	2.7
8	2.1	2.8	5.8	7.7	6.4	2.6	5.2	2.0	1.1	1.4	3.4	3.2
9	2.1	3.4	8.1	7.2	6.2	2.6	5.0	1.6	.9	1.3	8.0	3.6
10	2.1	3.4	10.6	6.7	5.7	2.6	4.4	1.4	.8	1.2	6.6	3.1
11	2.1	3.2	9.5	6.2	5.2	2.4	4.0	1.5	.5	1.1	4.5	2.9
12	2.2	3.1	9.2	5.8	10.2	2.0	4.0	1.5	.7	1.0	4.0	2.2
13	3.1	3.0	17.3	5.3	19.1	1.9	4.1	1.5	.6	.9	2.8	2.0
14	2.9	3.2	15.6	5.2	14.2	1.8	4.1	1.4	.4	.5	3.2	1.9
15	2.9	2.6	15.2	5.0	10.4	1.8	4.3	1.4	.3	.4	2.4	1.6
16	2.2	2.6	24.7	5.0	12.3	1.9	4.0	1.2	.3	.5	1.9	1.5
17	1.8	2.6	19.2	5.0	17.8	2.3	3.6	1.0	.5	.5	1.9	1.2
18	1.7	2.9	14.0	5.6	14.6	2.6	3.5	1.1	.8	.5	1.7	1.2
19	3.5	3.1	11.6	6.1	10.2	2.9	2.9	1.3	1.0	.6	1.4	1.4
20	9.7	3.8	9.8	6.3	8.7	2.9	2.5	1.5	1.5	.8	1.4	1.4
21	6.5	5.1	8.8	5.7	7.5	2.8	2.5	1.5	1.9	.8	1.4	1.3
22	5.8	11.3	8.4	5.1	6.6	2.3	3.0	2.2	1.8	1.1	1.4	1.2
23	5.7	15.2	9.6	5.0	5.8	2.1	3.2	2.2	2.2	1.4	1.2	1.3
24	5.6	10.5	9.8	5.2	5.2	2.4	2.8	2.0	3.8	1.6	1.2	1.2
25	5.5	8.6	13.0	5.4	4.8	3.8	3.8	1.6	8.0	1.5	.9	1.2
26	5.2	8.5	13.2	5.0	4.5	5.8	3.7	1.5	7.0	1.3	.9	1.3
27	5.2	10.6	11.0	5.7	4.3	5.6	5.6	1.4	5.5	1.0	1.0	1.3
28	5.3	14.4	9.2	9.6	4.0	8.3	4.6	1.4	4.9	.8	1.0	1.5
29	5.6	10.8	14.0	8.6	3.9	7.7	4.2	1.4	3.0	.8	.9	2.0
30	10.4	......	23.2	8.6	3.6	6.0	3.4	1.2	2.7	.8	.9	2.2
31	10.4	......	16.1	......	3.7	......	2.0	1.3	......	.8	......	......

NOTE.—Observer made no report relative to ice. Relation of gage height to discharge probably not materially affected by ice during 1912.

NORTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

Location.—Half a mile above the confluence of North and South forks of New River, about 2½ miles north of Crumpler, N. C.

Records available.—August 13, 1908, to December 31, 1912.

Drainage area.—279 square miles.

Gage.—Staff gage attached to posts on right bank. The chain gage in use from August 13, 1908, was replaced by the present staff gage July 23, 1911. The staff gage is at the same location and reads to same datum as former chain gage.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat at a section one-eighth mile below the gage, or by wading. The boat cable section was formerly at a ford one-fourth mile above the gage, but was moved July 23, 1911, to a point one-eighth mile below gage.

Floods.—The flood of April 20, 1901, reached a height of about 16.4 feet referred to the datum of the present gage.

Winter flow.—Flow little if at all affected by ice.

Accuracy.—The gage-height record is considered very reliable. Sufficient data have not been obtained to permit estimates of discharge to be made. This gaging station was not visited by engineers of the Survey during 1912, but on December 17, 1913, the station was visited and the elevations of bench marks and zero of gage were checked with a wye level and a discharge measurement was made.

Daily gage height, in feet, of North Fork of New River near Crumpler, N. C., for 1912.

[J. J. Garvey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.55	2.9	2.5	3.0	2.65	1.92	1.86	2.1	1.64	1.66	1.47	1.66
2	2.4	2.6	2.35	4.3	2.5	2.5	2.05	1.78	1.56	1.62	1.53	1.58
3	2.35	2.45	2.4	4.1	2.45	2.5	2.45	1.70	1.56	1.59	1.47	1.72
4	2.25	2.1	2.3	3.4	2.35	2.0	2.55	2.1	1.54	1.60	1.42	1.61
5	2.05	1.97	2.45	3.1	2.4	1.97	3.2	1.94	1.56	1.56	1.46	1.78
6	1.84	2.1	2.4	2.85	2.4	1.90	3.5	1.76	1.52	1.55	1.44	1.82
7	2.75	2.05	2.55	2.75	2.55	2.05	2.7	1.71	1.52	1.52	2.15	1.75
8	2.65	2.15	2.9	2.70	2.45	1.90	2.35	1.68	2.35	1.50	2.30	1.64
9	2.65	2.0	2.4	2.5	2.4	1.78	2.25	1.76	1.67	1.48	1.83	1.60
10	2.6	2.0	3.2	2.4	2.25	1.72	2.15	2.05	1.52	1.47	1.70	1.53
11	2.65	1.86	2.85	2.35	2.2	1.70	2.1	1.82	1.46	1.46	1.65	1.56
12	2.6	1.92	2.8	2.3	2.5	1.68	2.25	1.74	1.44	1.46	1.60	1.52
13	2.6	1.90	3.3	2.25	2.3	1.66	1.99	1.70	1.54	1.46	1.60	1.83
14	2.3	1.88	3.2	2.20	2.15	1.77	1.98	1.69	1.54	1.66	1.78	1.62
15	2.35	1.86	5.1	2.2	2.3	2.0	2.05	1.65	1.54	1.87	1.67	1.54
16	2.4	1.86	5.0	2.2	3.2	2.2	1.84	1.62	1.51	1.58	1.58	1.63
17	2.25	1.94	3.8	2.25	2.85	1.80	1.86	1.60	1.47	1.52	1.54	1.43
18	2.5	2.05	3.3	2.2	2.6	1.78	1.84	1.66	1.59	1.48	1.52	1.58
19	2.95	2.3	3.0	2.1	2.45	1.82	2.15	1.69	2.3	1.58	1.50	1.56
20	3.4	2.4	2.85	2.05	2.3	1.75	2.1	3.3	1.90	1.74	1.50	1.42
21	2.8	3.1	2.75	2.15	2.2	1.67	2.15	2.65	1.52	1.57	1.49	1.46
22	2.45	3.6	2.65	2.35	2.15	1.62	1.90	2.3	1.48	1.56	1.49	1.47
23	2.4	2.8	2.55	2.55	2.1	1.74	1.88	2.1	3.6	1.61	1.49	1.50
24	2.3	2.75	3.2	2.25	2.0	2.0	1.78	1.89	3.2	1.65	1.48	1.50
25	2.3	2.85	3.2	2.2	2.0	2.85	2.25	1.82	2.15	1.54	1.48	1.64
26	2.2	2.95	3.1	2.1	2.0	2.0	2.0	1.78	1.96	1.51	1.46	1.78
27	2.3	3.7	2.95	2.45	1.9	1.85	1.82	1.77	2.05	1.48	1.48	1.98
28	2.05	3.2	2.8	2.6	1.88	1.88	1.76	1.68	1.89	1.48	1.62	2.0
29	2.7	2.75	4.6	2.55	2.35	1.91	1.70	1.62	1.76	1.48	1.96	1.98
30	3.7	....	3.8	2.96	2.2	2.05	2.2	1.63	1.73	1.46	1.70	2.15
31	3.2	....	3.3	....	1.98	....	1.84	1.87	....	1.44	....	2.85

NOTE.—Observer made complete reports relative to ice. Relation of gage height to discharge probably affected by ice about Jan. 7-21 and about Feb. 6-20. Observer reported river frozen over Jan. 6-24, with ice from 3 to 12 inches thick. Ice began to break up and run out on Jan. 25 and was all gone Jan. 29. Ice was present from Feb. 3 until after the 17th and was about 4 inches thick. Effect of ice in February was probably relatively slight.

REED CREEK AT GRAHAMS FORGE, VA.

Location.—At highway bridge at Grahams Forge, Va.

Records available.—July 29, 1908, to December 31, 1912.

Drainage area.—247 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Permanent; bottom solid rock.

Discharge measurements.—Made from downstream side of bridge.

Point of zero flow.—A determination by leveling July 20, 1911, indicates that there would be no flow past the gage if the river stage were to fall to 0.6 foot ± 0.1 foot, by the gage datum. Point of control is permanent.

Winter flow.—Relation of gage height to discharge is sometimes affected by ice for short periods.

Artificial control.—There is a dam and gristmill just above the station. The storage is small and the miller states that water flows over the dam at all times. The flow is therefore little if at all modified by the operation of the mill.

Accuracy.—The gage-height record is considered accurate and reliable. Sufficient data have been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:

September 24, 1912: Gage height, 3.80 feet; discharge, 1,330 second-feet.

Daily gage height, in feet, of Reed Creek at Grahams Forge, Va., for 1912.

[J. T. Black, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.71	2.92	2.90	3.3	2.94	2.44	2.72	2.80	2.18	2.31	2.16	2.12
2	2.67	2.78	2.80	4.1	2.81	2.42	2.89	2.59	2.15	2.27	2.15	2.14
3	2.61	2.55	2.79	4.5	2.74	2.46	2.69	2.46	2.15	2.28	2.14	2.17
4	2.60	2.52	2.72	3.65	2.68	2.43	2.59	2.48	2.13	2.26	2.14	2.20
5	2.32	2.68	2.70	3.3	2.60	2.44	2.92	2.44	2.16	2.21	2.08	2.36
6	2.50	2.70	2.74	3.2	2.67	2.38	2.96	2.38	2.16	2.22	2.15	2.40
7	2.50	2.60	2.80	3.1	2.78	2.40	2.72	2.32	2.14	2.21	2.27	2.38
8	2.5	2.50	3.20	3.05	2.83	2.36	2.66	2.30	2.22	2.20	2.69	2.37
9	2.44	2.42	3.9	2.92	2.80	2.29	2.56	2.30	2.19	2.19	2.45	2.31
10	2.62	2.42	3.6	2.86	2.70	2.30	2.50	2.37	2.12	2.17	2.34	2.26
11	2.44	2.44	3.25	2.82	2.72	2.28	2.56	2.34	2.14	2.18	2.29	2.24
12	2.40	2.40	3.15	2.84	2.91	2.27	2.61	2.28	2.13	2.16	2.28	2.22
13	2.44	2.38	4.3	2.74	3.45	2.25	2.60	2.26	2.14	2.17	2.24	2.14
14	2.52	2.37	4.2	2.72	3.05	2.28	2.46	2.23	2.14	2.26	2.22	2.22
15	2.32	2.42	5.2	2.68	2.94	2.25	2.40	2.23	2.14	2.32	2.22	2.16
16	2.42	2.40	4.8	2.78	4.2	2.30	2.34	2.22	2.12	2.28	2.20	2.18
17	2.20	2.36	3.8	2.73	3.9	2.32	2.30	2.20	2.14	2.20	2.17	2.18
18	2.34	2.40	3.45	2.79	3.3	2.28	2.28	2.27	2.36	2.17	2.18	2.20
19	2.48	2.52	3.25	2.74	3.05	2.26	2.44	2.27	2.86	2.20	2.18	2.19
20	3.05	2.63	3.15	2.70	2.90	2.25	2.30	2.27	2.37	2.24	2.18	2.14
21	2.92	3.3	3.0	2.66	2.79	2.21	2.26	2.30	2.26	2.22	2.16	2.08
22	2.74	3.9	2.97	2.71	2.72	2.24	2.32	2.26	2.20	2.20	2.16	2.09
23	2.64	3.15	2.88	2.91	2.66	2.23	2.30	2.32	3.15	2.20	2.14	2.12
24	2.62	2.98	3.05	2.83	2.62	2.38	2.26	2.36	3.7	2.18	2.17	2.14
25	2.52	3.25	3.55	2.74	2.60	3.4	2.32	2.28	2.90	2.16	2.15	2.16
26	2.50	3.4	3.3	2.67	2.55	2.76	2.44	2.27	2.64	2.20	2.12	2.12
27	2.60	3.9	3.1	2.87	2.53	2.70	2.31	2.28	2.52	2.16	2.08	2.21
28	2.61	3.35	2.99	3.4	2.56	3.2	2.24	2.24	2.47	2.14	2.15	2.18
29	2.65	3.1	5.7	3.05	2.51	2.71	2.28	2.20	2.38	2.16	2.09	2.20
30	2.70	......	4.1	3.1	2.52	2.79	2.64	2.21	2.35	2.15	2.14	2.36
31	3.2	......	3.5	......	2.48	......	2.58	2.20	......	2.16	......	3.25

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1-20 and about Feb. 4-16.

BIG REED ISLAND CREEK NEAR ALLISONIA, VA.

Location.—Twelve hundred feet above a suspension footbridge at J. P. Thomas's farm, 1½ miles from Allisonia, Va., and half a mile above mouth of Little Reed Island Creek.

Records available.—July 31, 1908, to December 31, 1912.

Drainage area.—291 square miles.

Gage.—Vertical staff gage fastened to a tree on right bank; datum unchanged since established.

Channel.—The channel is liable to change caused by deposits of silt from ore washing; the point of control below the gage is permanent and is unaffected by the silt.

Discharge measurements.—Made from downstream side of suspension footbridge 1,200 feet below gage, or by wading under bridge.

Point of zero flow.—A determination of leveling July 19, 1911, indicates that there would be no flow past the gage if the river stage were to fall to —0.7 foot ±0.2 foot.

Winter flow.—The relation of gage height to discharge is sometimes affected by ice in winter.

Accuracy.—This station was not visited by engineers of the Survey during 1912. Sufficient data have not been obtained to permit estimates of discharge to be made.

Daily gage height, in feet, of Big Reed Island Creek near Allisonia, Va., for 1912.

[K. M. Thomas, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.90	0.74	0.82	1.25	0.95	0.81	1.05	0.66	0.42	0.50	0.47	0.57
2	.66	.77	.71	1.40	.88	.80	.86	.59	.35	.47	.75	.58
3	.62	.66	.80	1.35	.82	.85	.70	.50	.30	.48	.51	.60
4	.58	.70	.76	1.15	.81	.83	1.0	.73	.35	.48	.46	.54
5	.55	.82	.82	1.05	.78	.81	.77	.72	.35	.47	.48	.89
6	......	.99	.80	.99	.80	.79	1.05	.54	.37	.46	.46	.92
7	......	.99	.80	1.00	.80	.77	.75	.50	.33	.47	1.98	.88
8	......	.94	.94	1.15	.82	.74	.80	.49	.40	.45	1.53	.70
9	......	.86	1.2	1.05	.74	.71	.75	.55	.45	.43	.85	.62
10	......	.74	1.05	.99	.68	.71	.89	.56	.37	.42	.70	.58
11	......	.64	.94	.90	.79	.70	.76	.60	.35	.43	.64	.57
12	......	.56	1.05	.88	4.8	.69	.79	.48	.32	.43	.63	.55
13	......	.51	1.6	.84	2.6	.68	.73	.60	.34	.44	.66	.50
14	1.05	.51	1.2	.86	1.40	.60	.82	.52	.43	.54	.76	.49
15	1.1	.52	2.4	.86	1.40	.88	.73	.47	.45	.75	.67	.51
16	1.1	.58	2.1	.84	2.40	.78	.62	.65	.62	.50	.58	.60
17	1.1	.53	1.4	.88	2.0	.71	.70	.50	.35	.54	.44	.45
18	1.15	.58	1.15	.92	1.45	.68	.76	.48	.53	.47	.49	.50
19	1.25	.63	1.0	.84	1.25	1.05	1.10	.45	.58	.50	.57	.60
20	1.4	.60	.96	.79	1.15	.68	.68	.50	.65	.70	.55	.59
21	1.1	.71	.91	.80	1.10	.65	.62	.48	.55	.50	.50	.54
22	1.05	2.2	.86	.88	1.00	.63	.72	.47	.38	.48	.51	.49
23	1.0	.98	.86	1.00	1.00	.77	.60	.53	1.80	.45	.51	.50
24	.96	.90	1.25	.82	.96	.92	.55	.41	1.90	.50	.52	.58
25	.88	1.25	1.3	.78	.93	.74	.65	.38	1.25	.49	.50	.67
26	.80	1.2	1.1	.77	.92	.70	.62	.40	.72	.47	.49	.72
27	.79	1.7	.98	.91	.96	.68	.52	.48	.66	.45	.50	.80
28	.78	1.1	.90	.94	.88	.67	.50	.40	.62	.45	.50	.90
29	.68	.94	2.7	.88	.88	.70	.49	.40	.54	.45	.54	.89
30	1.3	......	1.7	1.25	.94	.72	.48	.49	.52	.46	.50	.72
31	.92	......	1.25	......	.87	......	.52	.44	......	.47	......	1.10

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 3–20 and about Feb. 2–16. Observer reported "backwater" Jan. 18; "creek frozen solid across at some places" Jan. 20, ice 6 to 10 inches thick; and "backwater" Feb. 5 and 6, ice about 5 inches thick.

LITTLE RIVER NEAR COPPER VALLEY, VA.

Location.—At highway bridge about 5 miles south of Childress and half a mile north of Copper Valley, Va., and 600 feet above the mouth of Indian Creek.

Records available.—July 25, 1908, to December 31, 1912.

Drainage area.—195 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Regular and practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The high water of about 1900 reached a stage of approximately 12.9 feet referred to present gage datum.

Point of zero flow.—Determinations by leveling, July 18, 1911, and September 21, 1912, indicate that there would be no flow past the gage if the river stage were to fall to 1.8 feet ±0.2 foot. Control probably permanent.

Winter flow.—The discharge is affected by ice for short periods.

Accuracy.—Records of gage height are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:

September 21, 1912: Gage height, 3.30 feet; discharge, 152 second-feet.

Daily gage height, in feet, of Little River near Copper Valley, Va., for 1912.

[T. A. De Hart, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.68	3.52	3.67	4.05	3.70	3.54	4.15	3.58	3.19	3.28	3.26	3.38
2	3.52	3.71	3.48	4.25	3.63	3.58	3.73	3.41	3.17	3.26	3.38	3.34
3	3.51	3.58	3.50	4.2	3.62	3.67	3.55	3.36	3.16	3.25	3.32	3.34
4	3.49	....	3.53	3.93	3.52	3.54	3.55	3.61	3.13	3.25	3.26	3.36
5	3.22	....	3.69	3.83	3.49	3.57	3.89	3.57	3.15	3.28	3.22	3.62
6	3.25	....	3.50	3.82	3.54	3.58	4.2	3.42	3.19	3.25	3.38	3.68
7	[a]3.7	3.60	3.62	3.87	3.54	3.69	3.65	3.37	3.29	3.20	4.75	3.58
8	[a]3.55	....	3.82	4.0	3.50	3.58	3.59	3.36	3.47	3.20	4.2	3.42
9	....	....	4.65	3.80	3.44	3.51	3.52	3.42	3.33	3.20	3.64	3.34
10	....	....	4.15	3.69	3.40	3.48	3.72	3.47	3.25	3.20	3.44	3.31
11		....	3.96	3.64	3.56	3.47	3.58	3.41	3.16	3.20	3.42	3.30
12	....	....	4.3	3.66	7.3	3.45	3.72	3.36	3.09	3.18	3.36	3.30
13	3.65	....	4.8	3.68	5.0	3.46	3.61	3.39	3.15	3.20	3.38	3.31
14	....	3.50	4.4	3.68	4.25	3.51	3.77	3.35	3.13	3.35	3.48	3.35
15	....	....	5.8	3.68	4.2	3.65	3.52	3.35	3.26	3.62	3.42	3.52
16		....	5.3	3.66	5.4	3.59	3.47	3.33	3.16	3.38	3.32	3.38
17	....	3.42	3.83	3.70	4.95	3.51	3.37	3.32	3.16	3.25	3.31	3.38
18	....	3.62	4.05	3.76	4.3	3.53	3.39	3.25	3.29	3.22	3.30	3.35
19	....	3.61	3.94	3.58	3.99	3.65	4.2	3.31	3.73	3.28	3.29	3.36
20	4.15	3.53	3.87	3.53	3.86	3.58	3.59	3.35	3.53	3.38	3.28	3.36
21	....	3.76	3.88	3.54	3.86	3.55	3.43	3.35	3.22	3.32	3.29	3.36
22	....	5.1	3.81	3.59	3.79	3.66	3.39	3.35	3.19	3.26	3.30	3.32
23	....	3.93	3.78	3.72	3.76	3.65	3.37	3.27	3.69	3.40	3.29	3.32
24	....	3.76	4.25	3.52	3.72	4.15	3.35	3.35	4.65	3.36	3.22	3.42
25	....	4.45	4.35	3.52	3.69	3.61	3.43	3.19	3.89	3.26	3.24	3.54
26	....	4.3	4.1	3.50	3.69	3.72	3.45	3.25	3.54	3.28	3.28	3.50
27	3.54	5.1	3.90	3.70	3.64	3.63	3.47	3.27	3.78	3.24	3.28	3.62
28	3.51	4.1	3.82	3.83	3.64	3.49	3.31	3.25	3.51	3.21	3.29	3.62
29	3.62	3.91	6.3	3.73	3.68	3.46	3.27	3.21	3.40	3.22	3.36	3.62
30	4.3	....	4.6	3.86	3.74	3.46	3.28	3.22	3.32	3.22	3.40	3.65
31	3.90	....	4.2	....	3.60	....	3.31	3.21	....	3.20	....	4.02

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 6-29 and about Feb. 4-16. Observer reported river entirely frozen over at gage Jan. 13 and Jan. 20, with ice 5 to 6 inches thick, and Feb. 7 and 14, with ice about 5 inches thick. The ice was reported "broken up" at the control at all times. River reported open Feb. 17.

WALKER CREEK AT STAFFORDSVILLE, VA.

Location.—At highway bridge at Staffordsville, Va., 500 feet below the mouth of Whitley Creek.

Records available.—July 24, 1908, to December 31, 1912.

Drainage area.—277 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Rocky; practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Relation of gage height to discharge probably not affected by ice.

Artificial control.—A dam and power plant 300 feet above the station may affect the flow at low water.

Accuracy.—Gage-height record is considered reliable. Sufficient data have not been collected to permit estimates of discharge to be made.

Discharge measurements of Walker Creek at Staffordsville, Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 3	J. G. Mathers	6.41	1,860
4	....do	5.88	1,460
Sept. 30	C. T. Bailey	3.42	151

Daily gage height, in feet, of Walker Creek at Staffordsville, Va., for 1912.

[J. F. Durham, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.05	4.5	4.4	5.3	4.9	3.49	4.7	3.52	3.16	3.49	3.04	3.14
2	3.98	4.35	4.15	6.4	4.65	3.47	4.6	3.50	3.12	3.42	3.04	3.16
3	4.0	3.88	4.15	6.8	4.4	3.43	4.25	3.35	3.18	3.34	2.99	3.16
4	3.94	3.94	4.05	5.7	4.25	3.41	4.25	3.34	3.15	3.32	3.05	3.22
5	3.60	3.64	3.98	5.3	4.1	3.44	5.1	3.30	3.04	3.26	3.02	3.35
6	3.37	2.78	4.0	4.95	4.05	3.40	5.3	3.28	3.02	3.23	3.04	3.50
7	3.62	3.63	4.05	4.75	4.05	3.33	4.6	3.26	2.94	3.20	3.82	3.66
8	3.52	3.73	4.7	4.55	4.05	3.29	4.2	3.18	......	3.16	4.9	3.61
9	3.59	3.65	5.7	4.35	3.90	3.27	4.0	3.20	3.44	3.14	4.25	3.54
10	3.54	3.44	5.4	4.25	3.79	3.21	4.2	3.24	3.26	3.14	3.93	3.46
11	3.48	3.48	4.95	4.15	3.79	3.19	5.2	3.26	3.08	3.10	3.72	3.42
12	3.50	3.44	5.0	4.05	5.2	3.17	4.45	3.22	3.05	3.08	3.58	3.36
13	3.40	3.44	7.9	3.99	5.55	3.17	4.35	3.18	3.01	3.11	3.50	3.08
14	3.27	3.42	6.9	3.97	4.75	3.17	4.0	3.18	3.00	3.12	3.50	3.20
15	3.38	3.46	8.8	3.91	4.65	3.19	3.87	3.21	3.01	3.22	3.44	3.20
16	3.27	3.44	7.7	3.91	7.1	3.19	3.71	3.17	3.00	3.24	3.32	3.27
17	3.30	3.47	6.2	3.94	6.5	3.20	3.58	3.15	3.06	3.14	3.30	3.24
18	3.36	3.53	5.6	3.92	5.4	3.23	3.52	3.10	3.15	3.10	3.26	3.24
19	3.61	3.60	5.2	3.89	4.95	3.39	3.54	3.51	3.61	3.18	3.22	3.22
20	4.55	3.73	4.9	3.87	4.6	3.30	3.47	3.30	3.36	3.20	3.21	3.20
21	4.4	4.8	4.7	3.85	4.4	3.26	3.43	3.31	3.21	3.22	3.19	3.14
22	4.2	6.6	4.5	3.85	4.25	3.15	3.40	3.38	3.12	3.21	3.20	3.14
23	4.05	5.2	4.35	4.0	4.05	3.15	3.43	3.34	4.7	3.16	3.18	3.04
24	3.97	4.75	4.55	3.91	3.93	3.18	3.39	3.44	5.8	3.15	3.16	3.11
25	3.91	4.85	5.3	3.87	3.87	4.5	3.46	3.32	4.95	3.13	3.15	3.02
26	3.86	4.95	5.1	3.85	3.89	4.35	3.60	3.26	4.25	3.08	3.11	3.00
27	4.3	6.1	4.8	4.75	3.75	5.0	3.40	3.30	4.7	3.05	3.12	3.29
28	4.3	5.1	4.6	5.7	3.69	6.2	3.32	3.32	4.0	3.06	3.14	3.08
29	4.25	4.7	9.2	5.2	3.67	5.9	3.23	3.23	3.76	3.02	3.08	3.20
30	5.6	......	6.8	5.2	3.65	4.8	3.24	3.20	3.62	3.06	3.08	3.66
31	5.0	......	5.8	......	3.57	......	3.37	3.22	......	3.05	......	5.20

NOTE.—No ice reported by observer. Relation of gage height to discharge probably not affected by ice during 1912.

WOLF CREEK NEAR NARROWS, VA.

Location.—At highway bridge 3 miles above Narrows, Va., 1,500 feet below the New River, Holston & Western Railroad bridge, and 2½ miles above mouth of Mill Creek.

Records available.—July 22, 1908, to December 31, 1912.

Drainage area.—223 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Rocky, practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—A stage of approximately 15.5 feet, referred to gage datum, has been reached at this station; date unknown.

Point of zero flow.—A determination by leveling July 15, 1911, indicates that there would be no flow past the gage if the river stage were to fall to 1.1 feet ±0.2 foot.

Winter flow.—Relation of gage height to discharge not affected by ice except for short periods during extremely cold weather.

Accuracy.—Records of gage height are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:

September 19, 1912: Gage height, 2.76 feet; discharge, 88 second-feet.

Daily gage height, in feet, of Wolf Creek near Narrows, Va., for 1912.

[J. A. Hale, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.65	4.35	3.95	4.7	4.6	2.99	4.4	3.24	3.01	2.82	2.68	2.75
2	3.6	4.05	3.7	6.1	4.3	2.95	4.05	3.16	2.94	2.73	2.68	2.70
3	3.55	3.7	3.7	6.8	4.1	2.94	3.7	3.06	2.88	2.69	2.68	2.69
4	3.49	3.6	3.55	5.4	3.9	2.92	3.8	3.06	2.88	2.68	2.66	2.80
5	3.27	3.42	3.55	4.8	3.75	2.96	5.0	3.00	2.84	2.66	2.61	3.02
6	3.24	3.40	3.5	4.4	3.65	2.90	4.7	2.93	2.80	2.64	2.62	3.25
7	3.28	3.30	3.45	4.25	3.7	2.86	4.0	2.86	2.83	2.64	2.98	3.36
8	3.12	3.35	3.85	4.1	3.6	2.82	3.8	2.83	2.81	2.61	3.75	3.31
9	3.16	3.22	5.2	3.9	3.5	2.78	3.7	2.84	2.76	2.60	3.45	3.20
10	3.09	3.18	5.0	3.8	3.42	2.76	3.7	2.82	2.71	2.60	3.24	3.11
11	3.10	3.14	4.5	3.7	3.38	2.73	3.55	2.84	2.68	2.74	3.12	3.06
12	3.12	3.04	4.6	3.6	3.7	2.71	3.55	2.80	2.68	2.58	3.01	3.01
13	3.09	3.11	7.3	3.55	3.65	2.70	3.31	2.82	2.65	2.58	3.00	2.90
14	3.03	3.08	6.4	3.5	3.55	2.69	3.20	2.88	2.64	2.67	3.00	2.84
15	3.04	3.10	7.5	3.42	3.55	2.72	3.20	2.84	2.62	2.84	2.96	2.83
16	3.06	3.06	7.4	3.47	5.5	2.77	3.09	2.77	2.62	2.76	2.89	2.88
17	3.02	3.08	5.8	3.48	5.6	2.77	3.00	2.72	2.62	2.70	2.86	2.83
18	2.98	3.18	5.0	3.5	4.7	2.78	2.96	2.74	2.70	2.66	2.82	2.84
19	3.24	3.22	4.6	3.48	4.25	2.93	3.02	2.33	2.70	2.69	2.78	2.84
20	4.3	3.35	4.35	3.42	4.0	2.86	2.98	3.16	2.70	2.79	2.76	2.79
21	3.9	4.8	4.15	3.42	3.75	2.78	2.93	3.7	2.66	2.86	2.72	2.78
22	3.7	6.4	4.1	3.42	3.6	2.72	2.92	3.55	2.69	2.72	2.72	2.76
23	3.6	4.8	3.95	3.6	3.48	2.75	3.10	3.48	2.94	2.76	2.70	2.72
24	3.55	4.4	4.2	3.5	3.39	3.08	3.06	3.38	3.39	2.79	2.74	2.74
25	3.5	4.3	4.8	3.48	3.42	6.2	3.30	3.24	3.11	2.80	2.70	2.66
26	3.5	4.3	4.7	3.43	3.32	4.15	3.55	3.18	2.96	2.78	2.69	2.78
27	4.1	4.8	4.45	4.6	3.20	4.45	3.24	3.46	3.24	2.74	2.69	2.90
28	3.95	4.5	4.25	5.3	3.16	4.3	3.10	3.26	3.05	2.70	2.72	2.86
29	4.0	4.2	7.8	4.8	3.17	4.5	3.02	3.16	2.94	2.69	2.70	2.90
30	4.8	....	6.4	4.9	3.12	3.95	3.37	3.08	2.84	2.68	2.68	3.08
31	4.8	....	5.0	....	3.06	....	3.30	3.08	....	2.67	....	4.62

NOTE.—Relation of gage height to discharge probably not materially affected by ice during 1912. On Jan. 15 observer reported: "Five feet of ice below bridge on north side of creek; no ice on south side. There are springs above bridge."

BLUESTONE RIVER AT LILLY, W. VA.

Location.—At Lilly, W. Va., 2,000 feet below the mouth of Little Bluestone River.

Records available.—August 22, 1908, to January 13, 1912, and July 21 to November 7, 1912. See "Accuracy."

Drainage area.—454 square miles.

Gage.—Vertical staff gage in two sections; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat 150 feet above gage or by wading.

Point of zero flow.—Levels taken August 24, 1910, indicate that there would be no flow past the gage if the river stage were to fall to 0.0 foot ±0.2 foot.

Winter flow.—During portions of December, January, and February the flow may be affected by ice.

Accuracy.—This station was temporarily discontinued because of its inaccessibility. The gage was read during a part of 1912 to complete the comparison with the gage at True at low stages. No discharge measurements were made at Lilly during 1912. On November 13, 1913, the lower section of the gage was found to be in error. Gage heights of discharge measurements and daily gage heights for this station for 1910 and 1911 published in Water-Supply Papers 283 and 303 should be corrected as follows: August 24, 1910, to January 20, 1911, subtract 0.02 foot; January 21 to June 15, subtract 0.03 foot; June 16 to November 10, subtract 0.04 foot; November 11 to December 31, subtract 0.05 foot. The proper corrections have been applied to the gage heights for 1912 here published.

Daily gage height, in feet, of Bluestone River at Lilly, W. Va., for 1912.

[W. H. Lilly, observer.]

Day.	Jan.	July.	Aug.	Sept.	Oct.	Nov.
1	2.75	....	2.06	1.75	1.41	1.23
2	2.55	....	1.91	1.67	1.34	1.19
3	2.85	....	1.64	1.49	1.27	1.18
4	2.85	....	1.52	1.48	1.23	1.17
5	2.6	....	1.44	1.33	1.21	1.23
6	2.25	....	1.40	1.25	1.15	1.30
7	2.2	....	1.33	1.23	1.13	1.35
8	2.85	....	1.32	1.17	1.11	....
9	3.1	....	1.30	1.12	1.05	....
10	2.95	....	1.23	1.09	1.03	....
11	2.35	....	1.26	1.12	1.02	....
12	2.4	....	1.28	1.13	.99	....
13	2.5	....	1.34	1.10	1.04	....
14	....	....	1.28	1.09	1.09	....
15	....	....	1.32	1.08	1.17	....
16	....	....	1.27	1.05	1.23	....
17	....	....	1.23	.97	1.25	....
18	....	....	1.20	1.08	1.32	....
19	....	....	1.30	1.22	1.38	....
20	....	....	1.39	1.64	1.42	....
21	....	1.53	2.1	1.48	1.43	....
22	....	1.56	2.45	1.21	1.48	....
23	....	1.67	2.15	1.23	1.52	....
24	....	1.72	2.1	2.55	1.52	....
25	....	2.2	1.89	2.1	1.49	....
26	....	2.75	1.76	1.83	1.45	....
27	....	2.45	1.92	1.58	1.38	....
28	....	1.92	2.05	1.93	1.33	....
29	....	1.72	1.81	1.81	1.38	....
30	....	1.62	1.64	1.58	1.32	....
31	....	2.30	1.69	....	1.25	....

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably affected by ice Jan. 3-13. See "Accuracy" in station description.

BLUESTONE RIVER NEAR TRUE, W. VA.

Location.—At Barker's ford, 1 mile above the mouth of the river and three-fourths of a mile above True post office.

Records available.—October 17, 1911, to December 31, 1912.

Gage.—Staff gage in two sections, on right side of river.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat 20 feet below gage or by wading.

Point of zero flow.—A determination by wye levels on September 7, 1912, indicates that there would be no flow past the gage if the stage of the river were to fall to 0.5 foot±0.1 foot.

Winter flow.—The relation of gage height to discharge may be affected by ice for short periods during December, January, and February.

Accuracy.—Gage-height record is considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be published.

The following discharge measurement was made by wading at a section about 500 feet below the gage by C. T. Bailey:

September 7, 1912: Gage height, 1.64 feet; discharge, 69 second-feet.

Daily gage height, in feet, of Bluestone River near True, W. Va., for 1912.

[Arthur Barker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.05	3.4	2.65	3.35	3.55	1.89	3.15	1.97	1.73	1.72	1.50	1.55
2	2.8	3.05	2.3	9.0	3.1	1.84	3.8	1.97	1.72	1.70	1.50	1.56
3	2.65	2.65	2.3	7.1	2.85	1.88	3.2	1.92	1.70	1.68	1.50	1.54
4	2.55	2.5	2.3	4.4	2.65	1.86	2.7	1.88	1.68	1.66	1.50	1.50
5	2.3	2.4	2.25	3.4	2.5	1.86	3.8	1.85	1.67	1.66	1.50	1.56
6	2.25	2.3	2.25	3.15	2.65	1.78	3.7	1.80	1.66	1.61	1.50	1.80
7	2.25	2.15	2.3	2.95	3.7	1.67	3.35	1.76	1.64	1.59	1.56	2.00
8	2.25	......	3.0	2.85	3.4	1.62	2.6	1.71	1.60	1.56	1.62	2.05
9	2.25	......	4.7	2.65	3.0	1.62	2.35	1.70	1.58	1.50	1.70	2.00
10	......	......	4.3	2.5	2.65	1.59	2.45	1.70	1.56	1.48	1.76	1.95
11	......	......	4.0	2.45	2.85	1.57	2.35	1.66	1.56	1.46	1.90	1.90
12	......	......	7.0	2.4	4.9	1.54	2.25	1.62	1.53	1.46	1.88	1.86
13	......	......	6.7	2.3	3.8	1.52	2.3	1.62	1.52	1.48	1.88	1.84
14	2.4	......	5.8	2.5	3.5	1.52	2.95	1.62	1.50	1.51	1.86	1.80
15	......	2.05	4.8	2.4	2.95	1.52	2.25	1.64	1.50	1.54	1.82	1.76
16	......	......	5.4	2.3	3.35	1.63	1.94	1.65	1.50	1.60	1.77	1.70
17	......	......	4.0	2.25	3.7	1.74	......	1.64	1.46	1.60	1.70	1.66
18	......	......	3.8	2.65	3.2	1.86	1.92	1.66	1.42	1.50	1.66	1.64
19	......	2.25	3.4	2.55	2.7	1.94	1.97	1.69	1.39	1.60	1.60	1.61
20	......	2.45	2.9	2.45	2.55	2.05	2.1	1.74	1.62	1.65	1.59	1.61
21	......	2.8	2.25	2.35	2.5	1.90	1.92	2.25	1.50	1.66	1.59	1.60
22	......	3.15	2.55	2.35	2.4	1.72	1.90	2.45	1.49	1.62	1.58	1.60
23	......	3.3	2.65	2.55	2.35	1.75	1.82	2.3	1.65	1.60	1.54	1.60
24	......	3.0	5.2	2.5	2.25	2.7	1.92	2.25	1.70	1.61	1.50	1.60
25	2.8	2.7	5.0	2.35	2.05	4.8	1.96	2.15	......	1.66	1.50	1.62
26	2.75	3.0	3.9	2.3	2.05	3.7	3.00	2.1	......	1.62	1.50	......
27	3.1	3.6	3.5	4.7	2.1	5.0	2.1	2.6	......	1.60	1.50	......
28	3.3	3.25	3.7	5.0	2.0	3.8	2.1	2.0	......	1.61	1.50	......
29	4.0	2.85	5.8	4.6	1.96	2.85	2.0	1.92	......	1.57	1.50	......
30	5.8	......	6.0	4.1	1.98	2.6	1.97	1.92	......	1.52	1.50	......
31	4.4	......	4.0	......	2.0	......	1.92	1.90	......	1.50	......	......

NOTE.—Relation of gage height to discharge affected by ice about Jan. 6–26 and about Feb. 6–20. The observer reported as follows: Jan. 7, ice present last 10 days; Jan. 9, lower portion of gage torn out by ice; Jan. 14, river frozen over at gage and at control; ice 5 inches thick; Jan. 25, lower portion of gage replaced; Feb. 7 and 15, river open in middle, control partly frozen, ice 3 and 7 inches thick on respective dates. No record Sept. 25–30; gage broken by windstorm.

GREENBRIER RIVER NEAR MARLINTON, W. VA.

Location.—At Chesapeake & Ohio Railway bridge on the switch that runs to Campbell's lumber mill, 1½ miles above Marlinton, W. Va., and immediately below the mouth of Stoney Creek.

Records available.—July 9, 1908, to December 31, 1912.

Drainage area.—408 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Coarse gravel; control section probably not permanent.

Discharge measurements.—Made from downstream side of bridge.

Point of zero flow.—A determination by leveling September 6, 1912, indicates that there would be no flow past the gage if the river stage were to fall to 2.7 feet ±0.1 foot.

Winter flow.—Relation of gage height to discharge affected by ice during parts of December, January, and February.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be published.

Discharge measurements of Greenbrier River at Marlinton, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 23	C. T. Bailey	5.44	1,790
25	.....do	6.84	4,090
Sept. 6	.....do	3.27	[a] 35.1

[a] Measurement made by wading.

Daily gage height, in feet, of Greenbrier River near Marlinton, W. Va., for 1912.

[P. G. Johnston, Jan. 1–Aug. 17, and A. N. Rudd, Sept. 6–Dec. 31, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	......	4.85	5.8	4.21	3.52	4.40	4.26	......	3.78	3.48	3.62
2	5.8	......	4.75	5.5	4.16	3.48	4.33	4.02	......	3.62	3.45	3.56
3	5.35	......	4.65	5.25	4.12	3.46	4.28	3.82	......	3.64	3.45	3.64
4	4.9	3.03	4.55	5.1	4.07	3.44	4.24	3.72	......	3.50	3.42	3.88
5	4.5	......	4.5	4.8	4.02	3.42	4.18	3.66	......	3.49	3.40	4.02
6	4.16	......	4.44	4.5	3.96	3.42	4.13	3.59	3.31	3.45	3.40	4.7
7	4.12	......	4.37	4.28	3.91	3.40	4.05	3.56	3.31	3.40	5.45	4.8
8	4.25	......	4.30	4.44	3.88	3.39	3.96	3.52	3.31	3.44	5.9	4.5
9	4.32	......	4.26	4.7	3.86	3.38	3.89	3.60	3.30	3.42	5.1	4.25
10	4.37	......	4.21	4.6	3.83	3.35	3.83	3.60	3.30	3.40	4.6	4.18
11	4.42	2.97	4.16	4.48	4.55	3.32	3.79	2.55	3.29	3.40	4.36	4.15
12	4.40	......	4.23	4.32	6.5	3.28	3.74	3.49	3.25	3.40	4.15	4.08
13	4.38	......	4.55	4.22	8.7	3.26	3.68	3.46	3.24	3.40	4.00	4.03
14	4.34	......	5.0	4.14	6.7	3.22	3.62	3.44	3.25	3.40	3.95	4.00
15	4.30	......	8.7	4.08	5.6	3.19	3.56	3.42	3.25	3.38	3.90	4.10
16	4.30	......	8.6	4.6	7.5	3.29	3.52	3.42	3.26	3.38	3.82	4.10
17	4.28	......	7.0	5.1	7.0	3.59	3.46	3.41	3.26	3.36	3.70	3.92
18	4.26	2.85	6.1	5.35	6.0	4.01	3.40	......	3.32	3.38	3.70	3.92
19	4.26	......	4.8	5.4	5.5	4.08	3.33	......	3.39	3.38	3.63	3.85
20	4.24	......	5.45	5.05	5.3	4.00	3.27	......	3.38	3.45	......	3.85
21	4.24	7.0	6.0	4.9	5.0	3.90	3.24	......	3.40	3.48	3.62	3.85
22	4.42	6.5	5.4	4.8	5.6	3.83	3.22	......	3.36	3.48	3.61	3.80
23	4.75	6.2	4.9	4.7	5.15	3.76	3.18	......	3.82	3.50	3.60	3.65
24	4.8	5.8	5.8	4.6	4.7	3.70	3.63	......	4.9	3.60	3.56	......
25	4.75	5.6	6.3	4.55	4.35	3.58	7.2	......	4.7	3.70	3.53	[a] 3.8
26	4.7	5.4	5.9	4.46	4.07	3.48	7.6	......	4.08	3.68	3.50	......
27	4.6	5.2	5.5	4.39	3.88	3.63	6.4	......	4.00	3.62	3.50	......
28	......	5.1	5.1	4.34	3.74	3.88	5.7	......	3.85	3.60	3.58	......
29	......	4.95	7.2	4.30	3.66	4.49	5.1	......	3.78	3.55	3.50	......
30	......	......	6.9	4.26	3.60	4.75	4.8	......	3.82	3.52	3.50	3.80
31	3.12	......	6.2	......	3.56	......	4.5	......	......	3.50	......	6.3

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 7 to Feb. 21 and during most of the period from Nov. 27 to Dec. 30. Observer made no report concerning ice prior to Jan. 28, but from then to Feb. 18 river was reported partly frozen, with ice from 5 to 10 inches thick and broken up at the control. On Feb. 21 rain and the ice break-up were reported. On Nov. 28, Dec. 1 and 2, observer reported river frozen over. On Dec. 4–6, general rain; Dec. 12, ice running; Dec. 13, river frozen over; Dec. 14, "ice gorges up sometimes;" Dec. 25, ice heavy, with snow on top of it; Dec. 30–31, general rain on heavy snow—rain caused rise.

GREENBRIER RIVER AT ALDERSON, W. VA.

Location.—At highway bridge at Alderson, W. Va., half a mile above the mouth of Muddy Creek.

Records available.—August 1, 1895, to July 15, 1906; May 10, 1907, to December 31, 1912.

Drainage area.—1,340 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Permanent or nearly so; wide and shallow.

Discharge measurements.—Made from downstream side of bridge.

Floods.—No record of floods previous to installation of the gage. Maximum gage height since establishment of gage was 18.2 feet November 26, 1900.

Winter flow.—The records are affected little if any by ice.

The following discharge measurement was made by C. T. Bailey:

March 24, 1912: Gage height, 5.88 feet; discharge, 9,200 second-feet.

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for 1912.

[W. J. Hancock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.1	3.85	4.0	4.7	3.45	2.21	2.80	2.20	1.79	2.04	1.86	1.79
2	4.9	3.55	3.5	5.4	3.25	2.19	2.56	2.10	1.78	1.98	1.85	1.85
3	4.2	3.3	3.35	6.0	3.1	2.15	2.38	2.04	1.73	1.90	1.82	1.90
4	3.75	2.92	3.15	5.0	2.94	2.12	2.29	2.12	1.71	1.89	1.81	2.05
5	3.4	2.88	3.0	4.3	2.83	2.08	2.64	2.08	1.65	1.83	1.80	2.20
6	2.95	2.72	2.92	3.8	2.78	2.06	3.0	1.98	1.64	1.79	1.80	2.70
7	2.70	2.80	2.84	3.6	2.62	2.02	2.63	1.96	1.64	1.80	2.00	3.4
8	2.80	2.65	2.96	3.5	3.55	1.96	2.54	1.91	1.67	1.78	4.6	3.2
9	2.96	2.78	3.65	3.3	3.4	1.89	2.37	1.87	1.62	1.76	3.95	2.90
10	2.98	2.55	3.95	3.2	3.25	1.90	2.26	1.84	1.60	1.75	3.2	2.68
11	2.92	2.56	3.6	3.1	3.1	1.80	2.29	1.80	1.62	1.74	2.86	2.52
12	2.79	2.45	3.5	2.96	6.3	1.80	2.49	1.83	1.58	1.72	2.64	2.42
13	2.76	2.46	4.9	2.88	8.3	1.83	2.39	1.82	1.52	1.71	2.48	2.31
14	2.65	2.40	5.4	2.79	6.0	1.80	2.24	1.85	1.51	1.73	2.38	2.12
15	2.58	2.37	6.4	2.74	4.7	1.84	2.36	1.80	1.52	1.82	2.30	2.02
16	2.44	2.35	11.9	2.69	6.1	1.81	2.33	1.74	1.61	1.80	2.24	2.16
17	2.35	2.36	6.7	2.74	8.5	1.81	2.18	1.70	1.49	1.78	2.19	2.26
18	2.52	2.40	5.0	3.2	5.5	1.85	2.15	1.72	1.53	1.74	2.12	2.21
19	2.80	2.57	4.4	3.75	4.3	2.02	2.18	1.77	1.92	1.79	2.09	2.18
20	3.3	2.82	4.2	3.55	3.8	2.12	2.10	1.75	1.75	1.88	2.05	2.16
21	3.2	3.7	4.6	3.25	3.4	2.11	2.38	1.70	1.62	2.14	2.02	2.00
22	3.15	8.1	4.7	3.1	3.15	2.05	2.25	1.75	1.58	2.02	1.99	1.98
23	3.0	5.8	4.4	3.05	2.95	2.20	2.19	1.74	1.78	2.02	1.95	1.78
24	3.0	4.4	5.4	3.1	2.82	2.10	2.99	1.70	3.55	2.09	1.94	1.86
25	3.15	3.8	6.9	3.05	2.71	2.26	2.26	1.69	3.25	2.20	1.92	1.96
26	3.1	3.7	5.7	2.98	2.61	2.25	5.0	1.71	2.84	2.15	1.93	1.91
27	3.05	8.4	4.7	3.05	2.54	2.25	3.4	1.70	2.56	2.11	1.90	1.96
28	2.95	6.2	4.1	3.35	2.45	3.15	2.85	1.64	2.30	2.02	1.90	2.16
29	3.2	4.7	8.3	3.3	2.40	3.10	2.54	1.61	2.18	1.98	1.88	2.04
30	4.5	....	8.1	3.45	2.38	2.98	2.36	1.63	2.11	1.96	1.81	2.88
31	4.40	....	5.7	....	2.29	....	2.24	1.69	....	1.90	....	7.0

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 8 to 18. There may also have been some slight effect for a short period in February.

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,000	3,720	4,100	5,960	2,740	501	1,330	490	183	347	223	183
2	6,520	2,980	2,860	7,940	2,260	481	942	396	178	301	217	217
3	4,620	2,380	2,500	9,700	1,920	443	696	347	154	246	200	246
4	3,480	1,560	2,040	6,800	1,600	415	587	415	145	240	194	356
5	2,620	1,480	1,720	4,880	1,390	380	1,060	380	120	205	188	490
6	1,620	1,190	1,560	3,600	1,300	364	1,720	301	117	183	188	1,160
7	1,160	1,330	1,400	3,100	1,030	331	1,050	287	117	188	815	2,620
8	....	1,080	1,640	2,860	2,980	287	913	253	128	178	5,690	2,140
9	....	1,300	3,220	2,380	2,620	240	663	229	109	169	3,980	1,520
10	....	928	3,980	2,140	2,260	246	555	211	101	164	2,140	1,180
11	....	942	3,100	1,920	1,920	188	587	188	109	159	1,440	894
12	....	788	2,860	1,640	10,600	188	842	205	95	150	1,060	747
13	....	801	6,520	1,480	17,500	205	708	200	76	145	828	610
14	....	720	7,940	1,310	9,700	188	533	217	73	154	696	415
15	....	683	10,900	1,230	5,960	211	671	188	76	200	598	331
16	....	659	31,100	1,140	10,000	194	696	159	73	188	533	452
17	....	671	11,900	1,230	18,200	194	471	140	68	178	481	555
18	....	720	6,800	2,140	8,230	217	443	150	79	159	415	501
19	1,330	956	5,150	3,480	4,880	331	471	174	260	183	383	471
20	2,380	1,370	4,620	2,980	3,600	415	396	164	164	234	356	452
21	2,140	3,350	5,690	2,260	2,620	405	696	140	109	434	331	315
22	2,040	16,800	5,960	1,920	2,040	356	544	164	95	331	308	234
23	1,720	9,100	5,150	1,820	1,620	490	481	159	178	331	280	178
24	1,720	5,150	7,940	1,920	1,370	396	1,700	140	2,980	388	274	217
25	2,040	3,600	12,600	1,820	1,180	555	555	136	2,260	490	260	280
26	1,920	3,350	8,810	1,680	1,020	544	6,800	145	1,400	443	267	253
27	1,820	17,800	5,960	1,820	913	544	2,620	140	942	405	246	280
28	1,620	10,300	4,360	2,500	788	2,040	1,420	117	598	331	246	452
29	2,140	5,960	17,500	2,380	720	1,920	913	105	471	301	234	347
30	5,420	....	16,800	2,740	696	1,680	671	113	405	287	194	1,480
31	5,150	....	8,810	....	587	....	533	136	....	246	....	12,900

NOTE.—Daily discharge computed from a rating curve well defined between 46 and 8,230 second-feet (gage heights 1.4 and 5.5 feet), fairly well defined between 8,520 and 16,400 second-feet (gage heights 5.6 and 8.0 feet) and poorly defined above 16,400 second-feet (gage height 8.0 feet).

Mean discharge Jan. 8 to 18 estimated, because of ice, from gage heights, observer's notes, and climatologic records, at 700 second-feet. This estimate of discharge when the relation of gage height to discharge is believed to have been affected by ice is based on insufficient data and therefore should be used with caution. No correction applied for possible effect of ice in February.

Monthly discharge of Greenbrier River at Alderson, W. Va., for 1912.

[Drainage area, 1,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	10,000	....	2,230	1.66	1.91	C.
February	17,800	659	3,510	2.62	2.83	B.
March	31,100	1,400	6,950	5.19	5.98	B.
April	9,700	1,140	2,960	2.21	2.47	A.
May	18,200	587	4,010	2.99	3.45	A.
June	2,040	188	498	.372	.42	A.
July	6,800	396	1,040	.776	.89	A.
August	490	105	213	.159	.18	A.
September	2,980	68	395	.295	.33	B.
October	490	145	257	.192	.22	A.
November	5,690	188	759	.566	.63	B.
December	12,900	178	1,050	.784	.90	B.
The year	31,100	....	1,990	1.49	20.21	

NOTE.—See footnote to table of daily discharge.

GAULEY RIVER AT ALLINGDALE, W. VA.

Location.—At Baltimore & Ohio Railroad bridge one-fourth mile south of depot at Allingdale, W. Va., and immediately below the mouth of Rock Creek.

Records available.—July 3, 1908, to December 31, 1912.

Drainage area.—248 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Rough and irregular, but probably permanent.

Discharge measurements.—Made from upstream side of bridge or from wooden bridge near depot. The bottom of the stream is rough and irregular, but with extreme care accurate measurements can be made. The measuring section at the railroad bridge is a poor one, and measurements are made at the wooden bridge near the railroad depot whenever possible.

Point of zero flow.—Levels taken August 15, 1910, indicate that there would be no flow past the gage if the river stage were to fall to 3.33 feet ±0.2 foot.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods during December, January, and February.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by C. T. Bailey:

March 21, 1912: Gage height, 7.65 feet; discharge, 2,060 second-feet.

Daily gage height, in feet, of Gauley River at Allingdale, W. Va., for 1912.

[Harry Jones, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.2	7.6	6.25	6.7	5.9	4.71	5.25	7.2	5.15	5.15	5.0	4.80
2	6.65	7.2	5.95	6.6	5.85	4.65	5.15	6.2	5.0	5.05	5.15	4.89
3	6.6	7.0	5.90	7.6	5.80	4.54	5.15	5.75	4.98	5.0	5.15	5.2
4	6.15	7.0	5.6	7.0	5.6	4.78	5.45	5.5	4.96	4.90	5.05	5.5
5	5.6	6.7	5.45	6.6	5.5	4.77	6.4	5.3	5.1	4.84	5.0	5.9
6	5.2	6.65	5.35	6.25	5.45	4.57	6.05	5.15	4.90	4.78	4.98	6.4
7	5.2	6.4	5.25	6.05	5.6	4.57	5.6	5.0	4.94	4.75	5.05	6.5
8	5.3	5.8	5.25	6.65	6.05	4.54	5.25	4.9	4.82	4.70	9.0	6.25
9	5.35	5.6	5.6	6.3	6.35	4.42	5.1	4.85	4.98	4.68	7.0	5.9
10	5.3	5.35	5.8	6.0	6.0	4.37	5.4	4.78	4.66	4.64	6.2	5.65
11	5.3	5.1	5.7	5.8	5.75	4.36	6.55	4.87	4.68	4.60	5.9	5.6
12	5.2	5.05	5.8	5.65	11.1	4.20	6.05	5.25	4.54	4.60	5.65	5.6
13	5.15	5.0	6.05	5.55	8.6	4.20	5.45	5.5	4.50	4.60	5.5	5.4
14	5.0	4.98	6.7	5.45	8.1	4.22	5.3	5.05	4.47	4.60	5.5	5.05
15	5.0	4.75	6.6	5.3	6.75	4.18	5.8	4.88	4.46	4.60	5.4	5.15
16	5.0	4.97	10.6	5.25	7.7	4.12	7.1	4.78	4.42	4.62	5.3	5.4
17	5.05	5.0	7.8	5.95	8.8	4.22	6.05	4.70	4.44	4.62	5.25	5.4
18	5.1	5.05	7.0	6.2	7.6	5.15	5.8	4.62	4.68	4.62	5.2	5.1
19	5.3	5.15	6.9	6.3	6.85	6.05	8.7	4.80	4.70	4.74	5.15	5.1
20	6.45	5.2	7.3	5.95	6.35	6.1	6.7	5.7	4.76	5.35	5.15	5.15
21	6.0	6.05	7.8	5.7	6.0	5.45	6.0	5.5	4.68	5.15	5.15	5.1
22	6.05	7.6	8.0	5.55	5.75	5.1	7.5	5.3	4.52	4.95	5.15	5.9
23	6.15	6.8	6.9	6.0	5.55	4.98	6.65	5.3	4.54	5.05	5.15	4.7
24	6.25	6.6	7.1	5.95	5.35	5.15	6.0	5.3	6.85	6.1	4.98	5.0
25	6.15	5.95	8.8	5.75	5.2	5.1	9.7	4.96	6.3	5.7	4.98	4.85
26	6.05	6.35	7.4	5.6	5.15	5.6	8.0	4.86	5.65	5.45	4.90	4.86
27	5.7	11.8	6.7	5.5	5.05	6.1	6.7	5.1	5.55	5.45	4.85	5.0
28	5.25	7.2	6.25	5.7	4.96	6.5	6.05	5.0	5.5	5.3	4.75	5.2
29	6.9	6.7	8.3	5.5	4.93	5.8	5.7	5.95	5.3	5.2	5.0	[a] 5.3
30	10.2	....	8.6	5.8	4.92	5.45	5.9	5.8	5.3	5.1	4.68	5.4
31	7.7	....	7.4	....	4.83	....	5.75	5.35	....	5.1	....	8.5

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 6–19, and possibly at times during February. The observer reported on Apr. 1 that the river did not freeze over at the bridge, probably because of being high and swift at the gage, during the cold periods, but that on the pools both above and below the gage at a distance of about 200 yards the ice ranged from about 10 inches thick at the banks to about 5 inches thick at the center; that on Feb. 27 the ice began to break up and quite a large quantity came down from above, after which date there was no ice.

GAULEY RIVER NEAR SUMMERSVILLE, W. VA.

Location.—At highway bridge known as Brocks Bridge, 2½ miles southeast of Summersville, W. Va., and one-eighth mile below mouth of Muddlety Creek.

Records available.—July 6, 1908, to December 31, 1912.

Drainage area.—686 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged since established.

Channel.—Practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Relation of gage height to discharge may be affected by ice for short periods during December, January, and February.

Accuracy.—Gage-height records are considered reliable

The following discharge measurement was made by C. T. Bailey:

March 29, 1912: Gage height, 11.96 feet; discharge, 9,460 second-feet.

Daily gage height, in feet, of Gauley River near Summersville, W. Va., for 1912.

[Mrs. Sula Gawthrop, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.4	7.7	7.4	8.4	7.4	4.02	4.13	7.4	6.3	5.4	4.95	4.6
2	7.9	7.2	6.4	8.9	6.9	4.0	3.08	5.65	5.2	5.7	4.42	4.65
3	7.4	6.0	7.6	10.1	6.6	3.06	4.6	5.5	4.8	5.7	5.05	5.9
4	7.2	6.5	6.2	9.1	6.1	3.44	4.00	5.6	6.2	5.6	5.2	6.2
5	6.6	7.1	7.2	8.3	6.5	3.72	7.0	4.95	5.9	4.46	4.55	7.2
6	6.8	6.8	8.0	7.6	6.1	3.18	6.3	5.45	4.6	4.36	3.87	7.8
7	6.7	6.4	5.4	7.2	7.5	4.15	5.0	4.4	6.4	4.33	7.3	8.5
8	6.8	6.4	5.6	8.1	7.9	3.60	4.95	5.95	4.6	4.5	11.4	7.4
9	7.0	6.3	7.4	7.4	8.0	3.88	4.06	4.9	4.33	4.08	9.2	6.8
10	7.0	6.2	6.7	7.1	7.2	2.31	6.2	4.23	5.2	3.83	7.8	6.4
11	7.1	6.0	7.6	6.6	6.7	3.74	4.75	5.35	4.6	4.40	7.3	6.2
12	7.2	6.1	9.7	6.3	13.6	3.02	6.8	5.7	3.30	4.30	6.3	5.65
13	7.0	6.0	8.6	6.2	11.8	2.94	5.2	6.3	3.60	3.68	5.5	5.2
14	6.6	5.8	9.0	6.6	9.5	2.95	5.1	5.75	4.13	4.02	5.75	4.8
15	6.6	5.7	11.8	5.5	8.8	2.62	5.65	5.7	3.26	4.08	5.5	4.37
16	6.8	5.7	13.2	6.5	11.5	2.87	7.4	5.15	3.93	3.81	5.4	4.02
17	6.8	5.55	10.2	7.6	11.2	3.44	6.2	5.55	4.5	3.53	4.95	4.7
18	6.6	5.45	8.8	7.2	9.7	4.30	7.8	4.55	3.60	3.99	5.2	5.2
19	8.4	5.55	8.6	7.4	8.5	6.6	9.4	4.95	4.8	4.03	5.05	5.05
20	9.3	6.0	9.8	6.6	7.8	6.8	7.6	6.7	4.9	5.75	4.85	4.8
21	7.9	7.2	9.8	6.2	7.1	5.6	6.7	6.0	4.20	4.75	5.05	5.0
22	7.3	10.1	10.0	6.3	6.4	5.4	7.6	6.0	4.10	4.5	5.05	5.05
23	6.8	8.5	8.6	6.7	6.1	5.0	6.5	6.0	4.8	5.0	4.47	5.0
24	6.4	7.8	10.6	6.5	5.6	4.12	6.0	5.2	7.9	7.2	4.95	5.2
25	6.1	6.9	11.3	6.5	5.55	6.4	12.8	4.8	7.1	6.7	4.85	5.1
26	5.7	9.2	9.2	6.2	5.0	5.4	10.6	5.45	5.9	6.1	4.55	5.3
27	6.4	13.0	8.2	6.0	4.9	6.0	7.9	5.75	6.1	5.85	4.36	5.5
28	6.2	10.5	6.8	6.7	4.85	7.3	5.3	4.8	6.0	5.25	4.5	5.7
29	6.6	8.4	10.2	6.5	4.75	8.3	5.65	7.9	5.95	5.3	4.25	5.6
30	10.0	......	11.1	7.0	4.7	4.65	5.8	8.5	5.3	4.75	4.47	6.9
31	9.4	......	9.7	......	4.38	......	6.2	6.6	......	5.0	......	11.0

NOTE.—No report by observer relative to ice is available. Relation of gage height to discharge probably affected by ice during parts of January and February.

GAULEY RIVER NEAR BELVA, W. VA.

Location.—Three-fourths mile below Chesapeake & Ohio Railway bridge at Belva, W. Va., one-fourth mile below the mouth of Twentymile Creek, and about 5½ miles above the mouth of river at Gauley Bridge.

Records available.—August 25, 1908, to December 31, 1912.

Drainage area.—1,420 square miles.

Gage.—Vertical staff gage fastened to tree on right bank; datum unchanged since established. The sea-level elevation of the zero of the gage is 663.53 feet.

Channel.—Coarse gravel; practically permanent.

Discharge measurements.—Made from a boat 1,000 feet above gage or by wading.

Floods.—No records of floods previous to installation of gage are available. Maximum gage height since installation of gage was approximately 19 feet January 30, 1911.

Winter flow.—Relation of gage height to discharge may be affected by ice at intervals during December, January, and February.

Accuracy.—Records of gage height are accurate and reliable. Sufficient data have not been obtained to warrant the publication of estimates of discharge.

Discharge measurements of Gauley River near Belva, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 2	C. T. Bailey	6.16	[a] 6,460
Sept. 11	.....do	2.12	[b] 342

[a] At Kanawha & Michigan Railroad bridge 5 miles below gage; increase in drainage area about 1 per cent.
[b] Wading measurement.

Daily gage height, in feet, of Gauley River near Belva, W. Va., for 1912.

[C. L. Davis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	5.8	5.4	6.4	5.6	2.4	3.5	4.6	4.0	2.95	2.55	2.2
2	5.6	5.2	4.6	6.6	5.2	2.4	3.1	4.3	3.4	2.8	2.55	2.35
3	5.0	4.6	4.3	8.3	4.8	2.3	2.8	3.7	3.1	2.65	2.6	2.5
4	4.6	4.0	4.0	7.2	4.4	2.25	3.3	3.3	2.85	2.5	2.5	3.4
5	4.1	3.6	3.8	6.2	4.0	2.2	4.0	2.95	3.0	2.4	2.4	4.4
6	3.6	3.3	3.6	5.4	3.9	2.2	4.2	2.75	2.8	2.3	2.4	5.4
7	3.7	3.4	3.5	4.9	4.5	2.1	3.8	2.55	2.65	2.2	3.5	5.6
8	4.3	3.7	3.45	5.2	5.6	1.98	3.25	2.45	2.5	2.1	9.1	5.2
9	4.7	3.8	4.0	5.1	5.5	1.91	2.95	2.4	2.4	2.05	6.8	4.6
10	4.7	3.8	5.0	4.8	5.0	1.86	3.0	2.35	2.2	2.0	5.3	4.2
11	4.5	3.7	5.1	4.4	4.5	1.81	3.4	2.3	2.1	1.95	4.4	3.8
12	4.3	3.4	5.2	4.1	9.0	1.72	4.0	2.4	2.05	1.91	4.1	3.6
13	4.0	3.1	7.5	3.8	9.4	1.62	3.5	3.4	1.98	1.85	3.9	3.2
14	3.9	2.85	7.7	3.7	7.4	1.60	3.0	3.15	1.88	1.82	3.6	2.75
15	3.8	2.8	10.3	3.5	6.6	1.54	2.85	2.7	1.85	1.78	3.6	3.1
16	3.8	2.7	13.8	3.6	9.0	1.48	4.0	2.45	1.78	1.71	3.4	3.05
17	4.1	2.7	9.1	4.3	10.2	1.45	3.8	2.3	1.74	1.75	3.1	3.0
18	4.2	2.7	7.1	4.6	7.8	1.55	7.4	2.2	1.75	1.78	3.0	2.9
19	4.9	2.9	6.2	5.2	6.5	2.3	7.3	2.45	1.88	1.78	2.95	2.9
20	6.8	3.3	6.3	4.8	5.5	3.4	5.5	3.25	1.95	1.72	2.9	2.9
21	5.5	4.4	7.2	4.4	4.8	3.4	4.2	4.0	1.9	3.0	2.85	2.7
22	4.8	7.8	7.2	4.1	4.3	2.9	3.5	4.6	1.9	2.7	2.8	2.55
23	4.2	6.8	6.4	4.4	3.8	2.55	4.3	4.0	2.75	2.55	2.7	2.4
24	4.0	6.0	6.8	4.5	3.5	2.6	3.7	3.4	3.7	3.5	2.65	2.6
25	3.8	5.2	9.0	4.3	3.2	2.9	6.8	3.0	4.1	4.4	2.6	2.5
26	3.6	6.4	7.4	4.0	3.1	3.0	7.6	2.9	3.8	3.7	2.6	3.15
27	3.6	12.2	6.8	4.2	3.0	3.5	5.9	3.5	3.5	3.4	2.6	2.65
28	3.5	8.4	5.4	4.8	2.8	5.6	5.2	3.25	3.6	3.15	2.5	3.0
29	3.6	6.6	7.4	4.8	2.7	5.0	4.2	3.9	3.3	2.95	2.4	3.4
30	7.0	....	8.8	5.1	2.6	3.9	4.4	6.5	3.1	2.75	2.3	4.5
31	7.0	....	7.8	....	2.5	....	4.6	4.8	....	2.6	....	9.2

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 7-19 and Feb. 7-18. Observer reported as follows: Jan. 16, river entirely frozen over; ice about 4 inches thick, control partly frozen; Jan. 20, no ice; Feb. 4, river open in middle, ice along shore 2 inches thick, control open; Feb. 11, ice along shore 4 inches thick, ice broken up at control; Feb. 21, no ice.

CHERRY RIVER AT RICHWOOD, W. VA.

Location.—At the highway bridge at Richwood, W. Va., half a mile below junction of North and South forks.

Records available.—July 3, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Coarse gravel; practically permanent, but at different times stones and bowlders have been taken from the river bed in the vicinity of the point of control and the relation of gage height to discharge has thereby been affected. The first stones were removed during August, 1909; additional stones were removed during May, June, July, and August, 1911.

Discharge measurements.—Made from downstream side of bridge.

Point of zero flow.—A determination by leveling August 16, 1910, indicates that there would be no flow past the gage if the river stage were to fall to 1.3 feet ±0.2 foot.

Winter flow.—The relation of gage height to discharge is at times affected by ice during December, January, and February.

Accuracy.—See discussion under "Channel." Sufficient data have not been obtained to permit estimates of discharge to be published.

The following discharge measurement was made by C. T. Bailey, March 20, 1912: Gage height, 4.35 feet; discharge, 1,270 second-feet.

Daily gage height, in feet, of Cherry River at Richwood, W. Va., for 1912.

[Floyd Artrip, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	2.95	3.0	3.2	3.1	2.18	2.28	2.62	2.60	2.40	2.38	2.22
2	3.05	2.75	2.85	3.7	2.98	2.15	2.22	2.50	2.50	2.36	2.43	2.32
3	2.92	2.72	2.75	3.7	2.90	2.18	2.20	2.42	2.43	2.33	2.36	2.82
4	2.80	2.60	2.62	3.35	2.78	2.12	2.38	2.35	2.60	2.28	2.30	2.79
5	2.58	2.65	2.58	3.2	2.70	2.10	2.50	2.28	2.40	2.23	2.28	3.05
6	......	2.70	2.50	3.0	2.65	2.05	2.32	2.22	2.36	2.23	2.28	3.25
7	......	2.70	2.50	3.1	3.4	2.10	2.22	2.20	2.28	2.20	4.6	3.2
8	......	......	2.50	3.15	3.35	2.02	2.18	2.15	2.20	2.18	4.1	3.05
9	......	......	2.75	3.0	3.15	1.98	2.25	2.15	2.16	2.16	3.4	2.82
10	......	......	2.70	2.95	3.0	1.95	2.50	2.30	2.13	2.13	3.05	2.72
11	......	......	2.65	2.78	2.95	1.90	3.2	2.30	2.08	2.08	2.89	2.67
12	2.48	......	2.70	2.70	5.0	1.90	2.78	2.42	2.06	2.08	2.75	2.52
13	2.38	......	3.4	2.62	4.0	1.90	2.55	2.38	2.00	2.06	2.67	2.47
14	2.35	......	3.1	2.60	3.55	1.90	2.60	2.25	1.98	2.10	2.72	2.52
15	2.30	2.25	6.2	2.58	3.35	1.88	3.3	2.12	1.98	2.08	2.65	2.47
16	......	2.25	4.6	2.82	6.0	1.92	3.15	2.08	2.08	2.08	2.55	2.42
17	......	2.22	3.7	2.70	4.5	2.20	2.75	2.05	2.10	2.03	2.52	2.37
18	2.40	2.32	3.5	2.98	3.55	2.40	2.80	2.05	2.08	2.03	2.47	2.37
19	2.85	2.38	3.6	2.85	3.3	2.78	3.0	2.45	2.20	2.63	2.47	2.39
20	3.05	2.68	4.4	2.78	3.05	2.65	2.75	2.55	2.10	2.66	2.45	2.29
21	2.75	3.7	4.0	2.70	2.88	2.35	2.60	2.45	2.06	2.46	2.42	2.27
22	2.70	3.9	3.85	2.75	2.78	2.25	2.60	2.65	1.98	2.38	2.37	2.29
23	2.60	3.3	3.35	2.88	2.68	2.72	2.50	2.48	3.05	3.1	2.37	2.35
24	2.60	3.1	4.0	2.80	2.58	2.38	2.40	2.30	3.4	2.70	2.32	2.27
25	2.50	2.92	3.8	2.72	2.50	2.65	4.10	2.26	3.05	2.66	2.32	2.32
26	2.50	4.6	3.45	2.68	2.48	2.62	3.55	2.28	2.76	2.63	2.27	2.42
27	2.45	4.4	3.15	2.85	2.38	2.52	3.1	2.40	2.76	2.63	2.27	2.37
28	2.45	3.55	3.0	3.4	2.32	2.65	2.80	2.28	2.63	2.58	2.25	2.37
29	2.70	3.25	4.8	2.85	2.30	2.42	2.80	3.65	2.53	2.53	2.19	2.39
30	3.5	......	3.9	3.2	2.25	2.32	2.88	3.1	2.48	2.48	2.22	3.25
31	3.1	......	3.45	......	2.20	......	2.68	2.76	......	2.40	......	3.4

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 6-12, 16-18, and Feb. 5-17. Observer reported as follows: Jan. 6-11, river frozen over; Jan. 12, ice thawed out; Jan. 16 and 17, river frozen; Jan. 18, thawing; Feb. 8-14, river frozen; and Feb. 15, ice thawing out.

MEADOW RIVER NEAR RUSSELLVILLE, W. VA.

Location.—At Bays Ferry, 3 miles below Russellville, W. Va., one-fourth mile below mouth of Youngs Creek.

Records available.—July 17, 1908, to December 31, 1912.

Drainage area.—297 square miles.

Gage.—Standard chain gage attached to trees on left bank just above the ferry; datum unchanged since established.

Channel.—Practically permanent.

Discharge measurements.—Made from a boat or by wading.

Winter flow.—Relation of gage height to discharge is at times affected by ice gorges.

Accuracy.—In the fall backwater is sometimes caused at the gage by leaves lodging at the riffle below the gage. Because of an error in the gage found by wye levels on November 20, 1913 (before this report was prepared), gage heights of discharge measurements and daily gage heights for this station for 1909, 1910, and 1911, published in Water Supply Papers 263, 283, and 303, should be corrected as follows:

February 21, 1909, to June 7, subtract 0.02 foot.
June 8 to September 24, subtract 0.03 foot.
September 25, 1909, to January 11, 1910, subtract 0.04 foot.
January 12 to April 28, subtract 0.05 foot.
April 29 to August 15, subtract 0.06 foot.
August 16 to November 30, subtract 0.07 foot.
December 1, 1910, to March 17, 1911, subtract 0.08 foot.
March 18 to July 3, subtract 0.09 foot.
July 4 to October 19, subtract 0.10 foot.
October 20 to December 31, 1911, subtract 0.11 foot.

The necessary corrections have been applied to the gage heights in the following tables:

Discharge measurements of Meadow River near Russellville, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 27	C. T. Bailey	7.02	1,370
30	....do	9.44	3,230

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for 1912.

[J. R. Bays, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	6.8	6.4	7.5	6.9	3.81	4.55	3.79	4.15	3.83	3.86	3.56
2	6.3	6.4	5.9	7.8	6.3	3.73	4.06	3.69	4.09	3.71	3.82	3.74
3	6.0	5.8	5.35	8.7	6.0	3.65	3.85	3.57	3.89	3.60	3.78	3.98
4	5.7	5.6	5.0	8.1	5.6	3.57	4.07	3.39	3.73	3.51	3.71	4.65
5	6.3	[a] 5.5	4.95	7.0	5.25	3.50	4.5	3.35	3.71	3.42	3.60	6.0
6	5.6	[a] 5.2	4.8	6.3	5.15	3.42	4.8	3.29	3.67	3.33	3.56	6.4
7	5.5	[a] 5.1	4.7	5.8	6.1	3.37	4.9	3.23	3.59	3.27	4.41	6.6
8	5.3	[a] 5.05	4.7	5.4	6.3	3.29	4.7	3.18	3.49	3.24	7.9	6.2
9	5.1	4.75	5.9	5.8	6.1	3.26	4.17	3.15	3.35	3.19	6.9	5.6
10	4.85	4.43	6.3	5.5	5.7	3.21	4.42	3.14	3.27	3.15	5.9	5.15

[a] Gage height to top of ice.

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for 1912—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	......	4.38	6.2	5.3	5.4	3.09	4.29	3.13	3.23	3.12	5.45	4.9
12	......	4.36	6.4	5.05	9.3	3.04	4.23	3.11	3.19	3.10	5.0	4.7
13	......	4.36	8.3	4.9	9.4	3.00	4.09	3.09	3.17	3.10	4.75	4.55
14	......	4.32	8.2	4.8	8.5	2.95	3.84	3.08	3.05	3.12	4.65	4.35
15	4.36	4.22	10.9	4.7	7.2	2.91	4.17	3.06	2.94	3.15	4.55	4.33
16	......	4.18	12.2	4.9	9.1	2.89	4.11	3.05	2.96	3.20	4.41	4.28
17	......	4.19	9.6	5.1	11.1	2.87	4.11	3.01	2.94	3.27	4.29	4.23
18	......	4.26	7.8	5.5	9.1	3.05	4.95	2.98	2.98	3.24	4.22	4.17
19	......	4.43	7.1	5.7	7.2	3.38	4.55	3.09	3.00	3.44	4.14	4.14
20	......	4.85	6.8	5.5	6.3	3.72	3.89	3.41	2.98	4.46	4.07	4.07
21	......	7.1	7.3	5.3	5.6	3.80	3.66	4.04	2.95	4.41	4.02	3.97
22	5.4	......	7.3	5.1	5.1	3.52	3.57	4.8	2.94	4.20	3.96	3.83
23	......	8.3	7.0	5.5	4.85	3.34	3.43	4.55	3.14	4.41	3.93	3.80
24	......	7.1	7.9	5.6	4.65	3.25	3.35	4.23	4.10	5.1	3.90	3.76
25	......	6.4	8.8	5.35	4.47	3.15	4.07	3.84	4.55	5.25	3.89	......
26	......	7.3	8.3	5.2	4.34	3.41	5.15	3.59	4.46	4.85	3.87	3.79
27	......	10.0	7.1	5.5	4.21	3.83	4.7	3.44	4.22	4.7	3.82	3.91
28	......	8.4	6.5	6.8	4.07	6.2	4.32	3.37	4.10	4.26	3.70	3.98
29	4.37	7.2	8.7	6.5	4.04	5.7	3.97	3.81	4.00	4.20	3.46	3.96
30	7.5	......	9.5	7.0	4.01	5.25	3.89	4.34	3.89	4.06	3.38	5.00
31	7.3	......	8.5	......	3.89	......	3.83	4.19	......	3.94	......	8.0

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5-29 and Feb. 4-8. Observer reported as follows: Jan. 5, ice gorge; Jan. 10, river frozen up solid, ice 4 inches thick at gage; Jan 15, control frozen, river entirely frozen over, ice 5 inches thick at gage; Jan 22 and 29, control open, river partly frozen over, ice 6 and 4 inches thick at gage; and Jan. 30, ice gone out. No notes relative to ice during February. In October and November the gage observer reported that false work for the construction of the piers of the new county highway bridge below the gage was placed about the middle of October; that piers were started Oct. 28 and finished Nov. 6, and that the bridge would not be completed until after Dec. 31, 1912.

ELK RIVER AT WEBSTER SPRINGS, W. VA.

Location.—At suspension bridge on the grounds of the Webster Springs Hotel at Webster Springs, W. Va., one-fourth mile above the mouth of Back Fork Creek.

Records available.—July 1, 1908, to December 31, 1912.

Drainage area.—168 square miles.

Gage.—Vertical staff attached to right abutment of bridge; datum unchanged since established.

Channel.—Coarse gravel; practically permanent.

Discharge measurements.—Made from upstream side of bridge or by wading.

Point of zero flow.—Levels taken August 13, 1910, indicate that there would be no flow past the gage at a stage of 0.95 foot±0.2 foot.

Winter flow.—Relation of gage height to discharge is sometimes affected by ice.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be published. No discharge measurement was made at this station during 1912. Because of errors in the gage found by wye levels on December 3, 1913 (before the preparation of this report), gage heights of discharge measurements and daily gage heights for this station for 1910 and 1911, published in Water-Supply Papers 283 and 303, should be corrected as follows:

Gage heights below 6.0 feet:

August 20 to November 21, 1910, add 0.04 foot.
November 22, 1910, to February 28, 1911, add 0.03 foot.
March 1 to June 10, 1911, add 0.02 foot.

Gage heights above 6.0 feet:

March 1 to June 10, 1911, subtract 0.02 foot.
June 11 to September 20, 1911, subtract 0.03 foot.
September 21 to December 31, 1911, subtract 0.04 foot.

The necessary corrections have been applied to the daily gage heights for 1912 in the following table:

Daily gage height, in feet, of Elk River at Webster Springs, W. Va., for 1912.

[Cherry Woodzell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	3.25	2.90	3.5	2.70	2.00	2.47	3.1	2.15	2.32	2.06	1.96
2	3.5	3.06	2.80	3.7	2.68	1.94	2.40	2.97	2.07	2.19	2.12	2.06
3	3.2	2.92	2.76	3.9	2.67	1.96	2.30	2.75	2.07	2.09	2.07	2.51
4	3.05	2.90	2.68	3.7	2.60	1.98	2.68	2.52	2.07	2.01	2.02	2.61
5	2.96	....	2.60	3.45	2.56	1.97	3.3	2.41	2.01	1.97	1.96	2.91
6	....	....	2.53	3.25	2.49	1.92	2.93	2.29	1.99	1.95	1.96	3.15
7	....	....	2.50	3.15	3.15	1.92	2.63	2.19	1.99	1.93	3.85	3.25
8	....	....	2.50	3.35	3.5	1.87	2.38	2.05	1.89	1.86	4.4	3.06
9	....	....	2.88	3.15	3.4	1.80	2.30	2.02	1.81	1.83	3.6	2.91
10	....	....	2.99	2.98	3.1	1.77	2.38	2.01	1.76	1.78	3.15	2.74
11	....	2.40	2.83	2.83	2.88	1.70	2.86	2.06	1.69	1.75	2.84	2.67
12	....	....	2.78	2.70	5.6	1.60	2.80	2.29	1.67	1.73	2.68	2.58
13	....	....	3.45	2.60	4.6	1.58	2.56	2.17	1.63	1.71	2.58	2.41
14	2.6	....	3.5	2.50	3.9	1.58	2.93	2.03	1.61	1.72	2.56	2.36
15	....	....	5.7	2.48	3.6	1.58	2.98	1.97	1.57	1.68	2.48	2.35
16	....	....	5.4	3.5	5.4	2.24	2.93	1.96	1.62	1.67	2.38	2.28
17	....	....	4.1	3.4	4.5	2.73	2.80	1.89	1.77	1.67	2.35	2.24
18	....	2.55	3.7	3.45	4.0	2.48	4.15	1.92	1.79	1.65	2.30	2.22
19	4.0	....	3.55	3.25	3.6	2.78	4.2	2.32	1.79	1.71	2.28	2.26
20	3.65	....	4.2	3.06	3.3	2.98	3.45	2.72	1.79	2.27	2.25	2.25
21	3.3	3.5	4.35	2.86	3.05	2.68	3.06	2.59	1.81	2.12	2.21	2.23
22	3.1	4.25	4.1	2.78	2.83	2.48	4.35	2.42	1.77	1.92	2.16	2.21
23	2.78	3.55	3.8	3.5	2.63	2.42	3.65	2.29	1.97	2.02	2.16	2.16
24	2.72	3.2	4.35	3.15	2.43	2.33	3.2	2.19	3.05	2.75	2.16	2.12
25	2.64	2.95	4.6	2.98	2.26	2.30	4.85	2.07	3.05	2.62	2.16	2.04
26	2.58	4.8	3.9	2.87	2.22	2.38	4.0	1.97	2.82	2.49	2.15	1.96
27	2.55	5.4	3.55	2.78	2.19	2.66	3.45	2.05	2.62	2.38	2.14	2.51
28	2.52	4.06	3.2	2.78	2.18	2.98	3.06	2.12	2.49	2.28	2.04	2.56
29	3.25	3.45	4.1	2.72	2.17	2.73	2.92	1.99	2.37	2.20	1.96	2.61
30	4.35	....	4.6	2.74	2.14	2.53	3.06	2.43	2.45	2.15	1.96	3.9
31	3.6	....	3.9	....	2.06	....	2.97	2.31	....	2.10	....	4.35

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19 and Feb. 4–21. Probably little if any effect during December. Observer reported relative to ice as follows: Jan. 6, slush ice, gorged across river; Jan. 14, control partly frozen, river entirely frozen over at gage, ice about 12 inches thick; Jan. 19, ice going out; Feb. 3, river partly frozen, ice at gaging section 1 inch thick; Feb. 4, 11, and 18, control partly frozen, river frozen over, ice 2 inches thick on Feb. 4 and 10 inches on other dates; Feb. 21, rain, ice going out; Dec. 23 and 28, river frozen over, ice 2 to 5 inches thick, and Dec. 30, rain, ice gone out.

ELK RIVER AT GASSAWAY, W. VA.

Location.—At the Coal & Coke Railroad bridge in the northeastern part of Gassaway, W. Va., immediately below the mouth of Little Otter Creek.

Records available.—July 1, 1908, to December 31, 1912.

Drainage area.—578 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The sea-level elevation of the zero of the gage is 796.31 feet.

Channel.—Coarse gravel; point of control is probably permanent.

Discharge measurements.—Made from upstream side of bridge or by wading.

Floods.—No records of floods prior to the installation of the gage are available. The flood of January 30, 1911, reached a stage of 30.4 feet as determined by wye levels on September 13, 1912.

Point of zero flow.—Determinations by leveling August 12, 1910, and September 13, 1912, indicate that there would be no flow past the gage if the stage were to fall to 0.5 foot±0.2 foot.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be published.

Discharge measurements of Elk River at Gassaway, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 19	C. T. Bailey	5.48	2,170
Sept. 13	.....do	1.98	169

Daily gage height, in feet, of Elk River at Gassaway, W. Va., for 1912.

[H. A. Hays, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	5.7	5.1	6.7	3.25	1.86	2.64	4.4	2.82	3.05	1.96	1.86
2	5.4	5.1	4.8	6.7	3.2	1.68	3.05	4.9	2.74	2.98	2.04	1.84
3	4.9	4.1	3.9	7.4	3.15	1.80	2.78	4.1	2.48	2.80	2.31	1.84
4	4.7	3.9	3.7	6.5	3.1	1.38	4.7	3.6	2.42	2.44	2.27	1.88
5	4.4	3.7	3.15	5.6	3.5	1.46	3.5	2.92	2.26	2.10	2.23	2.02
6	4.1	4.1	2.84	4.9	3.2	1.80	4.6	2.52	2.22	2.02	2.19	3.8
7	3.9	3.8	2.58	4.6	4.2	1.78	3.8	2.36	2.18	1.96	2.12	3.9
8	3.9	3.7	2.76	4.5	6.9	1.59	2.67	2.22	2.30	1.94	5.0	3.8
9	3.8	3.6	3.6	4.4	6.3	1.62	2.69	2.23	1.69	1.88	6.0	3.15
10	3.7	3.3	3.1	4.1	5.0	1.64	2.68	2.65	1.70	1.84	5.3	2.99
11	3.6	3.2	3.8	3.8	4.0	1.36	2.54	3.05	1.79	1.79	3.9	3.10
12	3.6	3.05	4.6	3.5	8.6	1.48	2.78	2.26	1.24	1.75	3.35	2.94
13	3.45	2.79	7.0	3.35	9.8	1.47	2.70	2.53	1.54	1.72	3.05	2.94
14	3.4	2.44	8.2	3.25	7.3	1.39	2.68	2.60	1.88	1.71	2.98	2.70
15	3.35	2.29	9.0	3.15	6.0	1.29	2.66	2.42	1.87	1.70	2.94	2.41
16	3.3	2.26	15.9	2.90	8.7	1.42	2.64	1.91	1.86	1.70	2.90	2.49
17	3.3	2.22	9.2	8.0	11.8	2.09	2.80	1.76	1.84	1.69	2.88	2.38
18	3.7	2.19	6.5	4.6	7.4	2.72	4.2	1.62	1.98	1.68	2.84	2.47
19	4.8	2.34	5.5	5.3	6.3	2.67	8.5	1.88	2.00	1.70	2.81	3.7
20	5.0	3.6	5.8	5.4	5.4	2.68	8.9	2.42	1.98	1.74	2.48	2.39
21	4.6	4.3	7.6	4.4	4.2	2.64	7.1	3.7	1.94	1.92	2.27	2.20
22	4.5	5.7	8.6	4.2	3.7	2.78	8.6	3.7	2.28	2.30	2.26	2.05
23	4.5	4.8	7.4	4.2	3.25	2.74	7.4	2.86	3.3	2.48	2.24	1.98
24	4.2	4.4	6.8	4.3	2.96	2.25	7.2	2.50	3.6	2.22	2.23	1.96
25	3.4	4.4	10.0	4.0	2.83	2.40	16.6	2.39	3.5	2.10	2.22	1.96
26	3.3	7.8	7.8	3.7	2.39	3.35	12.7	2.40	3.4	2.06	2.20	1.99
27	3.4	15.5	6.1	3.4	2.29	3.45	9.8	2.62	3.35	2.04	2.18	2.12
28	3.6	8.7	5.1	3.6	2.14	3.25	9.2	2.40	3.3	2.02	2.05	2.66
29	5.3	6.3	7.0	3.5	2.55	3.6	8.9	3.5	3.25	2.00	1.88	3.6
30	9.1	....	9.0	3.15	2.18	3.40	4.2	4.5	3.1	2.10	1.86	5.1
31	7.8	....	7.1	....	2.10	....	4.6	3.9	....	2.02	....	10.9

NOTE.—On Apr. 30, in a general report, the observer stated: "No ice in the immediate vicinity of the gage except a little shore ice." Relation of gage height to discharge may have been affected slightly by ice about Jan. 7-17.

ELK RIVER AT CLENDENIN, W. VA.

Location.—At highway bridge in town of Clendenin, W. Va., immediately above mouth of Big Sandy Creek. See "Accuracy."

Records available.—June 27, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged since established. The elevation above sea level of the zero of the gage is 588.69 feet.

Channel.—Practically permanent; point of control is probably permanent.

Discharge measurements.—Made from downstream side of bridge or by wading.

Floods.—The high water of 1889 reached a stage of about 31.9 feet referred to gage datum.

Point of zero flow.—Levels taken August 11, 1910, and September 14, 1912, indicate that there would be no flow past the gage if the stage were to fall to 1.0 foot ±0.2 foot.

Winter flow.—Ice may affect the relation of gage height to discharge at times during December, January, and February.

Accuracy.—Big Sandy Creek empties into Elk River immediately below the gage and affects the gage height. This effect may be negligible during periods of low water in the Big Sandy, but at other times the flow of the creek may be a large percentage of the flow in the Elk River above the Big Sandy. On November 28, 1913 (before the preparation of this report), the station was visited by engineers of the Survey, and the flow of the Big Sandy measured and found to be 29 per cent of the flow in Elk River above Big Sandy Creek at that time. In making estimates of discharge at this station the discharge and drainage area of Big Sandy Creek should be included; that is, the Clendenin gage should be considered as an index of the flow of the Elk River just below the mouth of Big Sandy Creek. Discharge measurements at this station published to date do not include the flow of the Big Sandy, and should, therefore, be used with caution.

Discharge measurements of Elk River at Clendenin, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 16	C. T. Bailey	16.46	22,000
Sept. 14	.....do	2.38	195

Daily gage height, in feet, of Elk River at Clendenin, W. Va., for 1912.

[J. W. Riley, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	7.0	6.1	7.6	4.3	2.80	4.2	5.1	4.8	3.2	2.70	2.49
2	6.6	5.9	5.3	8.3	4.3	2.66	3.85	5.0	4.2	3.1	2.62	2.57
3	5.8	5.2	4.8	9.8	4.3	2.64	3.75	4.7	3.8	3.05	2.58	2.52
4	5.3	4.7	4.5	8.1	4.1	2.66	3.6	4.2	3.5	2.97	2.64	2.54
5	4.7	4.5	4.3	6.8	5.0	2.58	5.0	3.9	3.35	2.74	2.70	2.75
6	4.2	4.8	4.1	6.0	4.7	2.53	5.4	3.55	3.35	2.60	2.64	4.0
7	4.0	5.0	4.0	5.4	5.2	2.46	4.6	3.3	3.2	2.61	2.67	4.7
8	4.6	4.6	4.0	5.4	8.6	2.48	4.0	3.1	3.05	2.54	8.0	4.9
9	....	4.6	4.9	5.3	8.0	2.36	3.7	2.93	2.90	2.47	8.1	4.7
10	....	4.9	5.4	5.0	6.3	2.33	3.45	2.83	2.81	2.44	5.9	4.3
11	a5.2	4.3	5.6	4.9	5.5	2.30	3.15	2.91	2.67	2.40	4.7	3.9
12	a5.1	4.2	5.9	4.0	6.6	2.25	3.45	5.5	2.56	2.38	4.2	3.65
13	a4.6	4.0	11.0	4.4	10.9	2.24	3.4	4.8	2.50	2.32	3.8	3.45
14	a4.4	3.7	10.3	4.3	8.7	2.17	3.35	4.1	2.44	2.27	3.65	3.2
15	a4.3	3.6	11.8	4.1	6.8	2.06	3.05	3.7	2.37	2.32	3.55	3.0
16	a4.6	3.4	15.9	4.4	6.3	2.06	2.82	3.45	2.44	2.24	3.4	3.05
17	a4.6	3.45	11.6	4.2	10.0	2.13	3.35	3.15	2.37	2.25	3.25	3.05
18	a5.0	3.6	8.6	5.9	8.9	2.95	5.1	2.93	2.50	2.22	3.2	3.1
19	10.6	4.0	6.4	5.4	7.2	3.6	5.9	3.65	2.49	2.16	3.1	3.0
20	9.1	4.9	6.9	5.4	6.2	3.45	6.6	7.0	2.66	2.12	2.91	3.0
21	7.6	5.1	7.6	5.0	5.2	3.7	4.9	5.4	2.56	2.12	2.92	3.05
22	6.6	8.1	8.6	4.7	4.7	3.95	7.7	5.2	2.50	2.18	2.88	3.0
23	5.3	8.1	8.4	4.5	4.3	3.65	8.7	4.7	2.66	2.19	2.84	2.88
24	5.0	6.4	9.6	4.4	3.9	3.15	6.1	4.2	6.0	2.45	2.76	2.90
25	4.7	5.6	10.4	4.6	3.6	3.55	9.5	3.75	4.6	2.64	2.74	3.0
26	4.4	8.7	9.3	4.4	3.35	3.9	12.3	3.7	4.6	2.91	2.70	2.94
27	4.3	14.3	7.3	4.5	3.25	4.6	7.7	4.4	4.2	3.3	2.66	3.0
28	4.1	11.4	6.2	4.6	3.05	5.0	5.7	4.3	3.75	3.05	2.76	4.1
29	5.5	7.5	6.9	4.5	3.0	4.8	4.8	11.1	3.55	2.97	2.63	4.6
30	8.7	....	9.0	4.4	3.0	4.2	4.9	7.0	3.4	2.84	2.55	5.7
31	9.1	....	9.9	....	2.90	....	5.0	5.7	....	2.74	....	10.7

a Gage height to top of slush ice.

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably affected by ice Jan. 7-19 and about Feb. 5-12.

COAL RIVER AT BRUSHTON, W. VA.

Location.—At Chesapeake & Ohio Railway bridge at Brushton, W. Va., 500 feet above the mouth of Brush Creek.

Records available.—June 23, 1908, to December 31, 1912.

Drainage area.—379 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The elevation above sea level of the zero of the gage is 633.83 feet.

Channel.—A change in channel causing a change in the relation of gage height to discharge is indicated by the discharge measurement made September 17, 1912.

Discharge measurements.—Made from downstream side of bridge or by wading.

Winter flow.—The relation of gage height to discharge is little if at all affected by ice.

Accuracy.—Gage-height records are considered reliable. Sufficient data have not been obtained to permit estimates of discharge to be published.

Discharge measurements of Coal River at Brushton, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 3	C. T. Bailey	6.39	3,680
Sept. 17	....do	1.29	[a] 22.7

[a] Measurement made by wading at section about 1,500 feet above gage.

Daily gage height, in feet, of Coal River at Brushton, W. Va., for 1912.

[G. W. Fitzpatrick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	3.85	3.4	4.1	4.0	1.75	2.18	2.05	1.97	1.80	1.40	1.36
2	3.45	3.4	3.0	6.5	3.6	1.44	2.7	2.0	1.82	1.69	1.40	1.36
3	3.15	2.95	2.85	7.2	3.3	1.79	2.6	1.88	1.69	1.63	1.38	1.45
4	2.95	2.65	2.7	4.9	3.0	1.67	2.49	1.78	1.60	1.56	1.38	1.64
5	2.55	2.55	2.65	3.95	4.3	1.68	3.3	1.70	1.64	1.51	1.34	2.7
6	2.48	2.6	2.6	3.50	4.4	1.62	2.65	1.61	1.59	1.46	1.33	3.55
7	2.46	2.5	2.6	3.2	6.4	1.06	2.36	1.59	1.46	1.92	1.41	3.3
8	2.37	2.5	2.85	3.0	5.0	1.28	2.09	1.58	1.82	1.88	2.55	2.9
9	2.42	2.34	4.3	2.8	4.1	1.46	2.4	1.54	1.82	1.82	2.9	2.55
10	2.37	2.30	4.8	2.7	3.5	1.42	2.55	1.57	1.60	1.56	2.42	2.32
11	2.35	2.30	4.2	2.6	3.15	1.36	2.4	1.47	1.49	1.34	2.16	2.14
12	2.25	2.32	4.4	2.5	4.4	1.26	4.7	1.50	1.42	1.30	2.02	2.07
13	2.21	2.19	8.9	2.5	5.1	1.22	3.15	1.68	1.34	1.28	1.90	1.89
14	2.36	2.10	6.3	2.46	4.3	1.19	2.55	1.61	1.25	1.25	1.84	1.72
15	2.24	2.12	7.5	2.38	3.6	1.18	2.20	1.52	1.28	1.25	1.81	1.78
16	2.26	2.07	7.4	2.40	3.55	1.34	2.16	1.42	1.26	1.24	1.74	1.81
17	2.22	2.15	5.0	2.42	4.1	1.33	2.29	1.38	1.24	1.22	1.66	1.76
18	2.32	2.24	4.0	2.75	3.8	1.36	3.2	1.32	1.30	1.28	1.60	1.72
19	4.6	2.36	3.55	2.9	3.4	1.72	3.55	1.54	1.26	1.24	1.56	1.72
20	5.2	2.55	3.45	2.8	3.05	2.10	3.05	1.50	1.26	1.26	1.53	1.74
21	4.1	3.05	3.5	2.7	2.8	1.92	2.55	1.60	1.26	1.24	1.48	1.75
22	3.4	6.1	3.6	2.65	2.55	1.54	2.30	1.70	1.27	1.24	1.44	1.60
23	3.1	4.4	3.65	2.7	2.38	1.65	2.14	1.79	1.71	1.52	1.43	1.45
24	2.95	3.7	4.9	2.65	2.25	1.53	2.01	1.78	2.8	1.61	1.42	1.50
25	2.85	3.3	5.6	2.6	2.13	1.52	3.5	1.64	2.49	1.78	1.43	1.54
26	2.7	3.95	4.6	2.46	2.11	1.48	3.85	1.60	2.10	1.78	1.46	1.52
27	2.7	8.2	3.9	3.85	2.02	1.54	2.9	1.98	2.32	1.67	1.44	1.71
28	2.6	5.2	3.5	5.9	1.94	1.86	2.5	1.98	2.27	1.61	1.42	1.84
29	3.0	3.95	5.0	4.6	1.80	2.02	2.3	2.04	2.10	1.56	1.38	2.14
30	6.0	....	6.2	4.1	1.94	1.88	2.18	2.24	1.94	1.48	1.38	2.8
31	5.0	....	4.9	....	1.85	....	2.02	2.14	....	1.44	....	6.0

NOTE.—Observer reported as follows: Jan. 15, shore ice, river open under bridge; Jan. 16, about 100 feet below bridge river frozen over, with ice 5 inches thick; Feb. 11, about two-thirds of water surface frozen over; shore ice all that amounts to anything, ice at gage about 7 inches thick. Relation of gage height to discharge probably affected by ice about Jan. 6-18 and about Feb. 5-13.

COAL RIVER AT FUQUA, W. VA.

Location.—At W. C. Hoy's passenger ferry half a mile below Fuqua railroad station and 1 mile below the mouth of Fuqua Creek.

Records available.—October 12, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff gage in two sections on right bank.

Channel.—Firm sand.

Discharge measurements.—Made from boat 300 feet above gage or by wading.

Point of zero flow.—Wye levels, run September 16, 1912, indicate that there would be no flow past the gage if the river were to fall to a stage of 0.0 foot ±0.2 foot referred to gage datum.

Winter flow.—The relation of gage height to discharge may be affected by ice for short periods.

Accuracy.—Gage-height record is considered reliable. Sufficient data have not been obtained to warrant publication of estimates of discharge.

The following discharge measurement was made by C. T. Bailey by wading at a section about 500 feet above gage:

September 16, 1912: Gage height, 0.89 foot; discharge, 51 second-feet.

Daily gage height, in feet, of Coal River at Fuqua, W. Va., for 1912.

[W. C. Hoy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.6	6.0	5.0	6.6	6.3	1.65	2.34	2.32	2.00	1.65	0.94	0.94
2	4.6	4.8	4.1	10.4	5.4	1.56	4.6	2.04	1.72	1.48	.94	1.00
3	4.2	3.95	3.85	14.2	4.6	1.60	3.6	1.84	1.52	1.32	.91	1.04
4	3.8	3.8	3.65	9.0	4.0	1.64	2.84	1.67	1.40	1.22	.92	1.10
5	3.75	......	3.48	6.5	6.9	1.56	2.93	1.57	1.26	1.14	.90	1.76
6	4.0	......	3.42	5.3	6.8	1.48	2.84	1.44	1.26	1.10	.88	4.2
7	4.2	5.2	3.42	4.6	15.1	1.42	2.40	1.36	1.16	1.04	.98	4.0
8	4.6	......	3.75	4.3	10.9	1.30	2.01	1.30	1.28	1.00	1.13	3.33
9	4.6	......	5.8	3.75	7.4	1.28	2.01	1.30	1.44	.95	2.67	2.80
10	4.0	......	8.2	3.55	5.4	1.25	2.38	1.41	1.26	.91	2.40	2.41
11	3.5	3.75	6.8	3.25	4.5	1.14	2.34	1.34	1.12	.90	1.97	2.16
12	3.42	......	6.7	3.22	5.4	1.07	4.6	1.48	1.02	.85	1.76	1.99
13	3.12	......	15.8	3.14	7.7	.98	4.0	1.52	.94	.83	1.60	1.95
14	2.85	3.34	12.4	3.18	5.9	1.03	2.79	1.47	.90	.82	1.52	1.88
15	......	3.30	12.3	3.01	4.9	.94	2.15	1.36	.94	.80	1.47	1.85
16	......	3.22	14.3	2.96	4.9	.95	1.91	1.23	.89	.80	1.40	1.63
17	......	3.38	9.3	2.90	5.9	.96	1.90	1.13	.86	.79	1.34	1.56
18	3.20	3.5	6.6	3.8	5.8	1.13	2.76	1.09	.90	.78	1.26	1.50
19	[a]5.0	3.7	5.4	4.0	5.0	1.22	5.3	1.22	.95	.75	1.20	1.50
20	9.8	4.2	5.5	3.75	4.3	1.93	3.85	1.54	.93	.80	1.16	1.45
21	6.7	5.6	5.4	3.5	3.65	1.90	2.89	1.48	.87	.80	1.12	1.40
22	5.0	11.1	5.6	3.38	3.18	1.66	2.40	1.52	.86	.79	1.10	1.38
23	4.2	8.0	5.6	3.41	2.78	1.54	2.03	1.48	.94	.99	1.07	1.30
24	3.9	5.7	8.1	3.36	2.54	1.42	1.78	1.52	2.63	1.04	1.05	1.26
25	3.6	4.7	10.8	3.19	2.25	1.18	6.6	1.40	2.52	1.12	1.06	1.35
26	3.38	9.2	7.9	3.01	2.20	1.10	6.4	1.50	2.04	1.22	1.06	1.18
27	3.26	13.9	6.2	5.5	2.02	1.19	4.0	1.87	1.75	1.25	1.06	1.43
28	3.16	9.5	5.1	11.6	1.89	1.46	3.04	1.95	2.15	1.15	1.04	1.60
29	3.95	6.4	6.3	8.1	1.85	1.54	2.50	1.93	1.97	1.12	1.08	1.94
30	8.6	......	10.6	6.7	1.90	2.04	2.36	2.57	1.85	1.10	1.00	3.6
31	8.7	......	8.6	......	1.82	......	2.39	2.40	......	1.00	......	9.2

[a] Gage height estimated by observer.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19, Feb. 4–20, and Dec. 25–29. Observer made full report relative to ice, noting conditions as follows: Jan. 5, ice running; Jan. 6, ice gorged, thickness of ice at gaging section 2 inches; Jan. 14 and 16, river entirely frozen over, ice 7 inches thick, controlling section frozen over; Jan. 18, ice melting, water running over ice, average thickness of ice 6 inches; Jan. 19, can not cross river to read gage, river still frozen over except at banks, river rising, estimated gage height about 5.0 feet, ice breaking up and running out; Jan. 20, ice out; Feb. 4, ice along shores, slush ice running at controlling section; Feb. 7, frozen all week, ice about 5 inches thick and very rough, control frozen; Feb. 11 and 14, river entirely frozen over, ice 8 to 9 inches thick, control frozen over; Feb. 21 ice broke up at 9 a. m.; Dec. 26, river partly frozen over; and Dec. 30, ice broke up.

COAL RIVER AT TORNADO, W. VA.

Location.—At highway bridge at Upper Falls railroad station, one-fourth mile above Tornado, W. Va., and 1 mile above mouth of Smith Creek.

Records available.—June 24, 1908, to June 3, 1912. Station discontinued June 3, 1912, in favor of station at Fuqua. See "Accuracy."

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Practically permanent; strewn with large bowlders.

Discharge measurements.—Made from downstream side of bridge or by wading.

Point of zero flow.—Determined August 8, 1910, as approximately 1.2 feet. The control is a rough log dam and point of zero flow changes.

Winter flow.—The relation between gage height and discharge is affected by ice cover and gorges from one to two weeks at a time during December, January, and February.

Artificial control.—There is a low dam and water-power plant about 1,000 feet below the station.

Accuracy.—The low-water gage heights at this station are affected by the operation of the power plant below the station. Another gaging station has been established at Fuqua above the influence of this dam, by means of which the effect of the power plant upon the lower gage may be observed.

The following discharge measurement was made by C. T. Bailey:

April 3, 1912: Gage height, 9.90 feet; discharge, 11,900 second-feet.

Daily gage height, in feet, of Coal River at Tornado, W. Va., for 1912.

[G. C. Hoy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	3.6	4.0	3.5	4.1	4.0	1.96	16	2.48	2.36	9.4	2.55	3.6	......
2	3.6	3.55	3.18	6.1	3.65	1.90	17	2.35	2.42	5.7	2.54	3.9	......
3	3.41	3.28	3.05	9.6	3.36	1.90	18	2.74	2.42	4.2	3.11	3.9	......
4	3.2	2.94	2.92	5.4	3.2	......	19	4.8	2.52	3.16	3.10	3.6	......
5	2.78	3.06	2.81	4.2	4.5	......	20	6.3	2.86	3.7	3.04	3.28	......
6	3.02	3.0	2.8	3.7	4.2	......	21	4.3	3.50	3.65	2.92	3.04	......
7	2.58	2.92	2.82	3.4	10.4	......	22	3.6	6.4	3.75	2.88	2.76	......
8	2.78	2.76	2.98	3.26	6.9	......	23	3.3	4.8	3.75	2.91	2.58	......
9	2.95	2.82	3.8	2.98	4.4	......	24	3.14	3.9	5.1	2.84	2.43	......
10	2.82	2.52	4.8	2.88	3.8	......	25	2.99	3.55	6.7	2.75	2.32	......
11	2.75	2.45	4.2	2.78	3.36	......	26	2.86	5.3	4.4	2.66	2.28	......
12	2.5	2.50	4.2	2.74	3.6	......	27	2.82	9.2	4.0	3.85	2.22	......
13	2.47	2.50	11.2	2.70	4.6	......	28	2.75	5.7	3.6	7.4	2.09	......
14	2.35	2.45	7.9	2.66	3.9	......	29	3.2	4.1	4.1	5.2	2.00	......
15	2.48	2.35	7.9	2.60	3.55	......	30	5.0	......	6.2	4.2	2.09	......
							31	5.2	......	5.0	......	2.05	......

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–19 and about Feb. 3–20. Gage height to top of ice Feb. 11. It is questionable whether other gage heights during ice period were read to water surface or to top of ice. Observer reported ice as follows: Jan. 5, ice running, gorged above; Jan. 7, channel frozen over, thickness of ice at gaging station 3 inches; Jan. 10–17, river entirely frozen over, ice 4 to 6 inches thick; Jan. 19, ice breaking and running; Feb. 3, slush ice running; Feb. 4, ice gorged above; Feb. 5–10, river entirely frozen over above gage, channel open at gage; Feb. 11, river entirely frozen over; Feb. 12, river entirely frozen over, ice 2 inches thick at gage and 7 inches along shores; and Feb. 18, thaw beginning.

POCOTALIGO RIVER AT SISSONVILLE, W. VA.

Location.—At the highway bridge at the post office at Sissonville, W. Va., one-fourth mile below the mouth of Grapevine Creek.

Records available.—June 26, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from downstream side of bridge or by wading.

Floods.—The flood of June 27, 1910, reached a height of 33.0 feet by the gage datum. Some of the flood water passed around the gage.

Point of zero flow.—Levels taken August 10, 1910, indicate that there would be no flow past the gage if the stage were to fall to 1.2 feet ±0.2 foot.

Winter flow.—The relation of gage height to discharge may be affected by ice for short periods in December, January, and February.

Artificial control.—A dam and small power plant above the station modifies the low-water flow.

Accuracy.—Some of the flood water passed around the gage June 27, 1910. Sufficient data have not been obtained to permit estimates of discharge to be made. Because of an error in the gage found by wye levels on November 25, 1913, gage heights of discharge measurements and daily gage heights for this station for 1911, published in Water-Supply Paper 303, should be corrected as follows: February 11 to May 11, subtract 0.02 foot; May 12 to August 12, subtract 0.03 foot; August 13 to November 13, subtract 0.04 foot; November 14 to December 31, subtract 0.05 foot. The necessary correction has been applied to the gage heights in the following tables:

Discharge measurements of Pocotaligo River at Sissonville, W. Va., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 14	C. T. Bailey	6.09	961
15	do	13.38	4,130

Daily gage height, in feet, of Pocotaligo River at Sissonville, W. Va., for 1912.

[B. N. Sisson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.0	3.6	3.25	3.8	3.45	1.88	2.8	3.35	2.8	1.89	1.39	1.38
2	4.2	3.4	2.9	8.9	3.15	1.89	3.15	2.6	2.33	1.83	1.64	1.59
3	3.6	3.1	2.85	8.2	2.9	1.85	2.33	2.17	2.11	1.66	1.55	1.80
4	3.25	2.95	2.75	4.6	2.75	1.79	2.11	2.02	1.99	1.49	1.42	1.77
5	2.9	2.95	2.8	3.7	3.05	1.63	1.95	1.80	1.63	1.43	1.38	2.29
6	2.65	2.25	2.8	3.4	3.25	1.61	2.11	1.92	1.66	1.43	1.40	4.6
7	2.55	2.55	2.9	3.3	4.8	1.69	1.89	1.56	1.69	1.41	1.44	3.9
8	2.55	2.55	3.4	3.5	6.8	1.53	1.82	1.56	1.99	1.56	1.50	2.95
9	2.65	2.55	6.3	3.2	4.1	1.35	1.58	1.47	1.70	1.53	1.80	2.55
10	2.55	2.39	5.1	3.25	3.25	1.41	1.77	1.48	1.57	1.47	1.80	2.34
11	2.5	2.20	4.1	3.25	3.0	1.41	1.95	1.76	1.59	1.42	1.88	2.07
12	2.29	2.16	6.3	2.75	3.7	1.44	3.7	10.6	1.23	1.48	1.55	1.97
13	2.30	2.15	12.9	2.7	3.5	1.47	3.1	3.9	1.46	1.42	1.60	1.83
14	2.35	2.21	6.9	3.4	3.1	1.63	2.36	2.8	1.53	1.40	1.85	1.64
15	2.31	2.15	12.9	3.5	2.85	1.38	1.94	2.42	1.55	1.36	1.99	1.70
16	2.10	2.30	7.3	3.5	3.45	1.37	1.84	2.07	1.53	1.34	1.80	1.62
17	2.05	2.39	4.5	3.35	5.2	1.55	1.70	1.97	1.61	1.35	1.42	1.74
18	3.8	2.7	3.7	9.5	4.8	1.49	2.33	1.94	1.51	1.38	1.62	1.67
19	14.2	3.45	6.3	4.9	3.6	1.68	3.7	2.01	1.96	1.46	1.64	1.79
20	6.6	4.4	7.4	3.6	3.2	1.43	2.87	1.87	1.69	1.39	1.56	1.89
21	4.2	8.1	6.3	3.25	2.85	1.47	2.5	4.1	1.71	1.40	1.68	1.73
22	3.6	8.9	7.2	3.15	2.55	1.45	9.1	3.0	1.53	1.40	1.49	1.74
23	3.8	4.1	5.1	2.95	2.36	1.55	4.4	2.85	1.73	1.65	1.54	1.74
24	4.0	3.5	10.4	2.7	2.24	1.73	3.15	2.6	1.71	1.54	1.44	1.69
25	3.6	3.2	7.1	2.55	1.96	1.33	8.7	2.42	1.80	1.48	1.50	1.66
26	3.3	11.4	4.7	2.45	2.06	1.72	6.0	5.2	1.83	1.42	1.53	1.59
27	3.05	11.1	3.7	3.6	1.86	1.70	3.25	3.25	2.14	1.44	1.52	2.07
28	2.9	4.7	3.35	3.5	1.72	1.61	2.75	2.5	1.86	1.41	1.39	2.7
29	6.8	3.7	9.3	3.25	1.82	1.85	2.5	10.9	2.55	1.41	1.40	3.0
30	7.4	....	5.9	3.9	2.29	3.2	2.35	3.8	2.26	1.38	1.39	7.1
31	4.6	....	4.3	....	2.22	....	2.6	3.4	....	1.40	....	6.9

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 7–17 and Feb. 5–15. Observer reported relative to ice as follows: River partly frozen with ice 5 to 6 inches thick Jan. 13 and 16; ice out Jan. 18; river partly frozen Feb. 6 and 13 with ice 1 to 3 inches thick, and on Feb. 18 ice and snow thawing.

MILL CREEK BASIN.

MILL CREEK AT ARLINGTON HEIGHTS, OHIO.

Location.—At Arlington Heights about 1,000 feet below confluence of East and West forks of Mill Creek.

Records available.—September 19 to December 31, 1912.

Drainage area.—109 square miles.

Gage.—Inclined staff fastened to posts on right bank.

Channel.—Earth, mud bottom, probably shifting.

Discharge measurements.—Made from boat at section or by wading both forks.

Winter flow.—Affected by ice during severe winters.

Accuracy.—Data insufficient for estimates of flow; gage heights reliable.

Cooperation.—This station is maintained in cooperation with the division of sewerage of the city of Cincinnati, Ohio, for use in connection with its sewerage studies.

The following discharge measurement was made by wading the East and West forks by Bailey and Root:

October 16, 1912: gage height 1.41 feet; discharge, 18.1 second-feet.

Daily gage height, in feet, of Mill Creek at Arlington Heights, Ohio, for 1912.

[H. C. Harris, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	....	1.52	1.55	1.42	16	....	1.42	1.55	1.42
2	....	1.55	1.50	1.65	17	....	1.42	1.60	1.72
3	....	1.55	1.48	1.58	18	....	1.55	1.52	1.68
4	....	1.55	1.42	1.50	19	1.60	1.62	1.50	1.68
5	....	1.55	1.42	1.55	20	1.55	1.42	1.55	1.58
6	....	1.48	1.48	2.20	21	1.48	1.45	1.52	1.48
7	....	1.45	2.00	1.58	22	2.70	1.80	1.48	1.32
8	....	1.48	1.78	1.58	23	1.90	1.98	1.48	1.38
9	....	1.50	1.70	1.52	24	1.75	1.65	1.48	1.40
10	....	1.50	2.05	1.48	25	1.70	1.60	1.42	1.38
11	....	1.50	1.55	1.48	26	1.60	1.52	1.58	1.48
12	....	1.50	1.55	1.42	27	1.52	1.40	1.48	1.58
13	....	1.45	1.58	1.32	28	1.48	1.40	1.40	1.48
14	....	1.40	1.55	1.28	29	1.48	1.48	1.42	1.52
15	....	1.50	1.52	1.42	30	1.48	1.50	1.40	1.72
					31	....	1.52	....	1.82

NOTE.—No ice reported by observer. Relation of gage height to discharge probably not materially affected by ice during time of record.

MILL CREEK AT CINCINNATI, OHIO.

Location.—At the Eighth Street Viaduct, Cincinnati, Ohio, about three-eighths mile above mouth of Mill Creek.

Records available.—September 10 to December 31, 1912.

Drainage area.—154 square miles.

Gage.—Standard chain gage attached to bridge.

Channel.—Concrete channel under bridge.

Discharge measurements.—Made from upstream side of bridge or by wading at the same section.

Winter flow.—Affected by ice during severe winters.

Accuracy.—For the greater part of the year gage heights are affected by backwater from Ohio River; estimates of the flow, therefore, can not be made.

Cooperation.—This station is maintained in cooperation with the division of sewerage of the city of Cincinnati, Ohio, for use in connection with its sewerage studies.

The following discharge measurement was made by wading at regular section by Bailey and Root:

August 23, 1912: Gage height, 1.54 feet; discharge, 121 second-feet.

Daily gage height, in feet, of Mill Creek at Cincinnati, Ohio, for 1912.

[Wm. Manning, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	....	5.19	6.89	2.79	16	1.8	2.42	4.69	3.52
2	....	5.53	5.59	2.97	17	1.75	2.47	3.09	2.08
3	....	4.63	3.73	2.57	18	2.5	2.69	2.29	1.87
4	....	3.67	2.47	2.81	19	1.84	2.31	1.89	1.81
5	....	2.06	1.81	3.22	20	1.86	2.43	1.89	.94
6	....	1.96	2.04	3.53	21	1.80	2.39	1.89	1.81
7	....	1.62	2.38	2.15	22	3.33	3.27	1.83	1.79
8	....	1.74	2.18	1.95	23	2.45	2.43	1.83	1.79
9	....	1.78	2.06	2.21	24	2.19	2.80	1.79	1.81
10	11.0	1.78	1.96	6.12	25	2.80	2.26	1.82	1.34
11	9.0	1.84	2.35	9.50	26	2.25	2.58	1.96	1.84
12	6.65	2.45	2.94	7.31	27	1.85	2.42	2.12	1.88
13	5.0	2.91	5.10	6.77	28	2.87	3.44	2.29	1.84
14	3.75	2.67	6.86	5.89	29	3.94	4.57	2.48	1.84
15	2.4	2.67	5.51	4.81	30	5.25	7.29	2.58	2.67
					31	....	8.01	....	2.33

NOTE.—Backwater from Ohio River was reported Sept. 10–12, 23–30; Oct. 1–4, 12–31; Nov. 1–20, 27–30; Dec. 1–4, and 10–16.

MIAMI RIVER BASIN.

MIAMI RIVER AT HAMILTON, OHIO.

Location.—At single-span highway bridge on High Street, Hamilton, Ohio.

Records available.—February 28, 1910, to December 31, 1912. Flood stages only, November 16, 1904, to February 27, 1910, reported by the United States Weather Bureau.

Drainage area.—3,580 square miles.

Gage.—Vertical staff gage in two sections fastened to the retaining wall on the left bank of the river about 100 feet above the bridge; upper section, placed by Weather Bureau in November, 1904, reads from 2.5 to 25.0 feet; lower section, placed by the United States Geological Survey, extends from 0.5 foot to 4.0 feet. Gage datum has not been changed.

Channel.—The section at the bridge shifts to some extent in floods on account of the high velocity; but the point of control, a short distance below, is apparently permanent under ordinary conditions.

Discharge measurements.—Made from upstream side of bridge.

Floods.—Maximum gage height 21.2 feet March 24, 1898, according to the records of the United States Weather Bureau.

Winter flow.—Relation of gage height to discharge may be at times affected by ice during very severe weather, but for short periods only, as factory wastes probably keep the temperature of the water above the freezing point.

Artificial control.—There are several power plants in Hamilton above the station, but all the water used by them is returned to the river above the gage; there is little if any regulation of the flow from this source.

Diversions.—The Miami & Erie Canal is fed by water taken from Miami River at Middletown and Miamisburg, Ohio. The quantity diverted is not known, but it is believed to be a considerable part of the low-water flow.

Accuracy.—Values of "discharge in second-feet per square mile" and "run-off (depth in inches)" published for this station in previous reports may be misleading and should be used with caution if at all. See "Artificial control" and "Diversions."

The following discharge measurement was made by C. T. Bailey:
August 21, 1912: Gage height, 2.14 feet; discharge, 1,930 second-feet.

Daily gage height, in feet, of Miami River at Hamilton, Ohio, for 1912.

[C. A. Huber, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.6	2.7	4.4	6.8	5.6	2.5	2.2	1.75	2.25	1.55	1.6	1.6
2	4.0	2.45	3.7	7.0	4.4	2.35	2.3	1.7	1.95	1.5	1.6	1.5
3	3.4	2.15	3.6	9.0	3.8	2.2	2.2	1.7	1.75	1.5	1.5	1.5
4	2.95	2.1	3.4	7.6	3.4	2.1	2.1	1.7	1.6	1.5	1.5	1.5
5	2.8	1.8	3.2	6.3	3.4	2.0	2.0	1.65	1.5	1.5	1.5	1.5
6	......	1.8	2.95	5.3	3.5	2.0	2.0	1.6	1.5	1.5	1.5	1.5
7	......	1.8	2.8	4.6	3.2	2.0	1.9	1.6	1.5	1.5	2.0	1.5
8	2.15	1.8	3.4	4.4	3.0	1.9	1.9	1.6	1.7	1.5	1.9	1.5
9	2.05	1.8	3.4	4.0	2.9	1.85	1.9	1.65	1.7	1.5	1.8	1.5
10	1.9	1.8	3.1	3.8	2.7	1.8	1.9	1.95	1.6	1.5	1.8	1.5
11	1.85	1.8	2.9	3.4	2.7	1.8	1.9	1.85	1.55	1.5	1.7	1.5
12	1.75	1.6	3.1	3.2	2.8	1.8	1.9	1.8	1.5	1.5	1.7	1.5
13	1.75	1.6	4.2	3.0	2.75	1.8	1.9	1.9	1.5	1.5	1.7	1.5
14	1.75	1.6	4.4	3.3	2.65	1.8	1.9	2.2	1.5	1.5	1.7	1.5
15	1.75	1.6	10.3	3.6	2.6	1.8	1.9	2.2	1.5	1.5	1.7	1.5
16	1.75	2.05	9.8	3.5	2.6	1.8	2.9	2.05	1.5	1.5	1.7	1.5
17	1.75	2.55	5.8	4.3	2.6	3.2	3.2	1.85	1.5	1.5	1.7	1.5
18	2.55	3.5	5.0	5.4	2.6	3.7	3.4	1.8	1.5	1.5	1.7	1.5
19	6.4	4.7	4.9	4.7	2.6	2.9	3.2	1.7	1.6	1.5	1.7	1.5
20	5.0	5.8	5.0	3.9	2.6	2.65	3.4	3.0	1.6	1.5	1.7	1.5
21	3.8	5.1	8.2	3.4	2.5	2.5	3.3	2.25	1.5	1.5	1.7	1.5
22	3.4	4.3	7.4	3.4	2.45	2.4	3.2	2.4	2.35	1.5	1.6	1.5
23	3.2	3.2	5.1	3.2	2.4	2.4	2.8	2.2	2.45	2.0	1.6	1.5
24	2.85	2.9	7.6	2.9	2.35	2.3	2.8	1.95	2.25	1.8	1.6	1.5
25	2.65	3.8	6.8	2.8	2.3	2.3	2.6	1.75	2.05	1.8	1.6	1.5
26	2.45	13.4	5.5	5.2	2.2	2.2	2.45	1.6	1.85	1.8	1.6	1.5
27	2.3	13.8	7.0	4.6	2.1	2.1	2.25	1.6	1.7	1.7	1.6	1.5
28	2.05	10.6	7.0	3.4	2.0	2.0	2.05	1.6	1.6	1.7	1.6	1.5
29	5.5	5.9	11.6	4.8	2.65	2.0	1.9	7.4	1.6	1.7	1.6	1.5
30	4.4	......	12.6	6.7	3.0	2.0	1.85	3.2	1.6	1.7	1.6	2.4
31	3.2	......	10.3	......	2.55	......	1.8	2.5	......	1.6	......	2.35

NOTE.—Jan. 8 to about Jan. 25 gage heights were taken from a reference point on the bridge because the gage was frozen in and surrounded by débris from a burned building. Relation of gage height to discharge probably affected by ice about Jan. 5–17 and Feb. 4–16. During January the observer reported ice along shores on the 5th, 11th, and 12th, ice 8 and 9 inches thick on the 11th and 12th, slush ice running on the 12th and in February. On the 5th ice along shores 3 inches thick; on Feb. 11 ice went out from shore opposite gage and on Feb. 12, ice along one shore 40 feet in width and 10 inches thick. No ice on control reported at any time.

Daily discharge, in second-feet, of Miami River at Hamilton, Ohio, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,080	3,310	8,440	16,800	12,400	2,800	2,100	1,160	2,220	860	920	920
2	7,160	2,680	6,230	17.400	8,440	2,440	2,330	1.070	1,560	800	920	800
3	5,330	1,990	5,930	25.200	6,540	2.100	2.100	1,070	1,160	800	800	800
4	4.000	......	5,330	16,700	5,330	1,880	1,880	1,070	920	800	800	800
5	......	......	4,730	14,900	5,330	1,660	1,660	995	800	800	800	800
6	......	......	4,000	11,400	5,630	1,660	1,660	920	800	800	800	800
7	......	......	3,580	9,080	4,730	1,660	1,450	920	800	800	1,660	800
8	......	......	5,330	8.440	4,150	1,450	1,450	920	1,070	800	1,450	800
9	......	......	5,330	7,160	3.860	1,350	1,450	995	1.070	800	1,250	800
10	......	......	4,440	6,540	3,310	1,250	1,450	1,560	920	800	1,250	800
11	......	......	3,860	5,330	3,310	1,250	1,450	1,350	860	800	1,070	800
12	......	......	4,440	4,730	3,580	1,250	1,450	1,250	800	800	1,070	800
13	......	......	7,800	4,150	3,440	1,250	1,450	1.450	800	800	1,070	800
14	......	......	8,440	5,030	3,180	1,250	1,450	2,100	800	800	1,070	800
15	......	......	30,700	5,930	3,050	1,250	1,450	2,100	800	800	1,070	800
16	......	......	28,500	5,630	3.050	1,250	3,860	1,770	800	800	1,070	800
17	......	2,920	13,100	8,120	3,050	4,730	4,730	1,350	800	800	1,070	800
18	2,920	5,630	10,400	11,700	3,050	6,230	5,330	1,250	800	800	1,070	800
19	15,200	9,410	10,100	9,410	3,050	3,860	4,730	1,070	920	800	1,070	800
20	10,400	13,100	10,400	6,850	3,050	3,180	5,330	4,150	920	800	1,070	800

Daily discharge, in second-feet, of Miami River at Hamilton, Ohio, for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	6,540	10,700	22,000	5,330	2,800	2,800	5,030	2,220	800	800	1,070	800
22	5,330	8,120	18,900	5,330	2,680	2,560	4,730	2,560	2,440	800	920	800
23	4,730	4,730	10,700	4,730	2,560	2,560	3,580	2,100	2,680	1,660	920	800
24	3,720	3,860	16,700	3,860	2,440	2,330	3,580	1,560	2,220	1,250	920	800
25	3,180	6,540	16,800	3,580	2,330	2,330	3,050	1,160	1,770	1,250	920	800
26	2,680	45,000	12,100	11,100	2,100	2,100	2,680	920	1,350	1,250	920	800
27	2,330	46,900	17,400	9,080	1,880	1,880	2,220	920	1,070	1,070	920	800
28	1,770	32,000	17,400	5,330	1,660	1,660	1,770	920	920	1,070	920	800
29	12,100	13,400	36,500	9,740	3,180	1,660	1,450	18,900	920	1,070	920	800
30	8,440	....	41,200	16,300	4,150	1,660	1,350	4,730	920	1,070	920	2,560
31	4,730	....	30,700	....	2,920	....	1,250	2,800	....	920	....	2.440

NOTE.—Daily discharge determined by means of a discharge rating curve that is fairly well defined below 210 second-feet (gage height 0.6 foot); well defined between 250 and 66,500 second-feet (gage heights, 0.7 and 17.5 feet); and is a tangent above 62,600 second-feet (gage height, 16.8 feet), and extended as such above 66,500 second-feet (gage height, 17.5 feet).

Discharge Jan. 5-17 and Feb. 4-16 estimated, because of ice, from gage heights, observer's notes, and climatologic records, as follows: Jan. 5-17, 1,400 second-feet; Feb. 4-16, 900 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been effected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Miami River at Hamilton, Ohio, for 1912.

[Drainage area, 3,580 square miles.][a]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	15,200	....	4,120	C.
February	46,900	....	7,650	C.
March	41,200	3,580	13,600	A.
April	25,200	3,580	9,160	A.
May	12,400	1,660	3,880	A.
June	6,230	1,250	2,180	A.
July	5,330	1,250	2,560	A.
August	18,900	920	2,170	B.
September	2,680	800	1,160	A.
October	1,660	800	912	B.
November	1,660	800	1,020	B.
December	2,560	800	914	B.
The year	46,900	....	4,100	

[a] Estimates of discharge in "second-feet per square mile" and "run-off (depth in inches)" would be misleading. See "Artificial control" and "Diversions."

NOTE.—See footnote to table of daily discharge.

DIX RIVER BASIN.

DIX RIVER NEAR BURGIN, KY.

Location.—At highway bridge on Burgin-Buena Vista pike, 4 miles from Burgin, Ky.

Records available.—July 2, 1910, to July 16, 1911; October 1, 1911, to December 31, 1912.

Drainage area.—416 square miles.

Gage.—Staff gage attached to abutment of bridge.

Channel.—Probably permanent

Discharge measurements.—See "Cooperation."

Winter flow.—Relation of gage height to discharge ordinarily not affected by ice.

Accuracy.—This station has not been visited by United States Geological Survey engineers, but the computations of daily and monthly discharge were made by the Survey. No discharge measurements were made during 1912. The station was last visited September 20, 1910, and the accuracy of the data published in the following tables depends upon the permanency of the gage and of the conditions of flow since that date.

Cooperation.—The station was established and measurements made by representatives of the Kentucky Geological Survey and the Madison Electric & Power Co., of Richmond, Ky. The gage reader's salary is paid by the Madison Electric & Power Co., and by the State Geological Survey of Kentucky.

Daily gage height, in feet, of Dix River near Burgin, Ky., for 1912.

[C. P. Kennedy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.2	6.55	6.95	6.2	7.65	3.65	4.3	3.4	3.7	3.2	2.8	3.3
2	8.8	6.4	6.4	15.6	6.35	....	3.9	3.3	3.6	3.2	2.9	3.4
3	8.0	6.4	5.95	12.6	5.95	....	3.7	3.2	3.4	3.2	2.9	4.2
4	7.5	6.15	5.7	9.1	5.35	....	5.2	3.2	3.9	3.2	3.0	4.5
5	7.05	5.65	5.65	8.5	5.5	....	5.6	3.1	3.8	3.1	3.3	5.0
6	6.9	5.25	5.7	7.5	6.9	....	5.1	3.0	3.6	3.1	3.4	12.2
7	6.6	5.0	5.85	6.45	8.2	....	5.5	3.4	3.8	3.0	3.6	8.9
8	6.1	4.7	10.7	5.85	8.1	....	5.5	3.3	3.7	3.0	3.6	6.9
9	5.75	4.6	12.2	5.45	7.15	....	4.9	3.7	3.7	3.0	3.8	5.8
10	5.65	4.4	10.0	5.2	6.5	3.3	4.2	5.5	3.6	3.0	4.7	5.5
11	5.35	4.35	8.4	5.0	5.9	3.3	8.7	5.0	3.4	3.0	4.6	5.4
12	5.2	4.4	10.8	4.9	14.8	3.3	6.0	4.7	3.3	3.0	4.5	5.4
13	4.9	4.35	10.8	4.9	9.4	3.3	5.5	4.1	3.2	3.0	4.4	5.2
14	4.8	4.3	11.8	5.55	7.65	3.3	5.1	3.8	3.0	3.0	4.3	5.2
15	4.7	4.2	17.6	5.4	6.75	3.3	4.6	3.5	3.0	2.9	4.1	5.1
16	4.7	4.1	12.0	5.25	6.1	....	5.4	3.3	2.9	2.9	3.8	5.1
17	4.5	4.05	8.5	5.35	5.35	3.3	5.1	3.3	2.9	2.9	3.8	5.0
18	4.35	4.05	7.0	5.7	4.85	3.3	8.0	3.2	2.9	2.9	3.8	5.0
19	18.8	4.0	6.75	5.45	4.55	3.4	6.6	3.8	2.9	2.9	3.8	5.0
20	11.4	4.5	6.45	5.15	4.25	3.55	6.1	4.6	3.0	2.9	3.8	5.0
21	7.7	12.8	6.05	4.95	4.0	3.65	4.8	4.8	2.9	2.9	3.7	4.9
22	6.15	11.4	5.95	5.15	3.85	5.45	4.6	4.8	3.0	2.9	3.6	4.9
23	6.75	9.2	6.7	5.05	3.7	4.0	5.8	4.8	3.0	2.9	3.6	4.9
24	6.45	8.4	12.8	4.85	3.7	3.95	5.0	4.8	5.0	2.9	3.5	4.9
25	5.9	7.55	12.0	4.7	3.6	3.85	4.6	4.4	4.6	2.9	3.4	4.8
26	5.55	11.8	9.7	4.7	3.45	3.7	4.3	4.1	4.0	2.9	3.4	4.8
27	5.5	11.0	8.6	4.7	3.4	3.55	3.9	3.7	3.6	2.8	3.3	4.8
28	5.65	9.4	7.05	7.85	3.4	3.5	3.7	4.5	3.4	2.8	3.3	5.4
29	6.05	8.1	6.8	10.6	3.8	3.9	3.5	4.5	3.4	2.8	3.3	5.8
30	6.55	....	12.0	10.6	3.8	4.25	3.4	3.9	3.3	2.8	3.3	5.8
31	6.8	....	7.95	....	3.8	....	3.4	3.8	....	2.8	....	9.2

Daily discharge, in second-feet, of Dix River near Burgin, Ky., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,900	1,060	1,270	878	1,700	92	219	60	99	41	15	50
2	2,580	978	978	9,770	952	87	132	50	84	41	20	60
3	1,950	978	765	6,440	765	83	99	50	60	41	20	195
4	1,600	854	665	2,850	536	79	485	50	132	41	26	270
5	1,330	646	646	2,340	590	75	627	33	115	33	50	420
6	1,240	502	665	1,600	1,240	70	452	26	84	33	60	6,000
7	1,080	420	724	1,000	2,100	65	590	60	115	26	84	2,670
8	830	327	4,400	724	2,020	60	590	50	99	26	84	1,240
9	684	298	6,000	572	1,390	55	388	99	99	26	115	704
10	646	244	3,700	485	1,030	50	195	590	84	26	327	590
11	536	232	2,260	420	744	50	2,500	420	60	26	298	554
12	485	244	4,510	388	8,860	50	786	327	50	26	270	554
13	388	232	4,510	388	3,120	50	590	172	41	26	244	485
14	357	219	5,560	608	1,700	50	452	115	26	26	219	485
15	327	195	12,100	554	1,160	50	298	71	26	20	172	452
16	327	172	5,780	502	830	50	554	50	20	20	115	452
17	270	152	2,340	536	536	50	452	50	20	20	115	420
18	232	152	1,300	665	372	50	1,950	41	20	20	115	420
19	13,400	151	1,160	572	284	60	1,080	115	20	20	115	420
20	5,140	270	1,000	468	207	78	830	298	26	20	115	420

Daily discharge, in second-feet, of Dix River near Burgin, Ky., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	1,730	6,660	808	404	151	92	357	357	20	20	99	388
22	854	5,140	765	468	124	572	298	357	26	20	84	358
23	1,160	2,940	1,140	436	99	151	704	357	26	20	84	388
24	1,000	2,260	6,660	372	99	142	420	357	420	20	71	388
25	744	1,630	5,780	327	84	124	298	244	298	20	60	357
26	608	5,560	3,410	327	66	99	219	172	151	20	60	357
27	590	4,720	2,420	327	60	78	132	99	84	15	50	357
28	646	3,120	1,330	1,840	60	71	99	270	60	15	50	554
29	808	2,020	1,190	4,300	115	132	71	270	60	15	50	704
30	1,060	....	5,780	4,300	115	207	60	132	50	15	50	704
31	1,190	....	1,910	....	115	....	60	115	....	15	....	2,940

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 50 and 6,550 second-feet (gage heights 0.3 and 12.7 feet). Above 6,550 second-feet the rating curve is simply an extension, and discharge values above that point should therefore be used with caution. See "Accuracy" in station description.

Monthly discharge of Dix River near Burgin, Ky., for 1912.

[Drainage area, 416 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	13,400	232	1,540	3.70	4.27
February	6,660	151	1,460	3.51	3.79
March	12,100	646	2,950	7.09	8.17
April	9,770	327	1,500	3.61	4.03
May	8,860	60	1,010	2.43	2.80
June	572	50	97.4	.234	.26
July	2,500	60	516	1.24	1.43
August	590	26	176	.423	.49
September	420	20	82.5	.198	.22
October	41	15	24.3	.058	.07
November	327	15	108	.260	.29
December	6,000	50	787	1.89	2.18
The year	13,400	15	855	2.06	28.00

NOTE.—See "Accuracy" in station description.

WABASH RIVER BASIN.

WABASH RIVER AT MOUNT CARMEL, ILL.

Location.—At Southern Railway bridge at Mount Carmel, Ill., 1½ miles below mouth of White River and immediately below mouth of Patoka River.

Records available.—June 16, 1884, to November, 1904, United States Army Engineer Corps; November, 1904, to December 31, 1912, United States Weather Bureau.

Drainage area.—Published by the United States Weather Bureau as 26,300 square miles.

Gage.—Staff gage attached to pivot pier of drawspan. Gage datum has remained unchanged since it was established in 1884.

Channel.—Slightly shifting.

Discharge measurements.—Made from downstream side of bridge. There are numerous overflow openings in the railroad embankment east of the railroad bridge.

Floods.—Maximum stage published by United States Weather Bureau as 28.3 feet August 7, 1875.

Winter flow.—The relation of gage height to discharge may be affected by ice for a week or so at a time during December, January, and February.

Accuracy.—Sufficient data have not been obtained to enable estimates of discharge to be made for publication.

Cooperation.—Gage heights furnished by United States Weather Bureau.

Discharge measurements of Wabash River at Mount Carmel, Ill., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 28	Horton and Monk	22.40	134,000
Aug. 13	Monk and Carr	3.28	9,590

Daily gage height, in feet, of Wabash River at Mount Carmel, Ill., for 1912.

[H. M. Phillips, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.9	12.8	18.9	22.5	17.2	6.8	3.3	4.2	5.0	4.4	2.2	2.3
2	8.5	12.6	19.3	22.3	17.6	6.2	3.3	3.9	4.9	4.2	2.2	2.3
3	8.7	12.3	19.4	22.4	17.9	5.8	3.3	3.5	4.8	4.1	2.9	2.3
4	8.2	......	19.4	22.5	18.1	5.6	5.0	3.3	4.3	3.6	3.3	2.2
5	......	......	20.4	22.7	18.2	5.5	8.0	3.1	3.7	3.1	3.5	2.1
6	......	......	20.8	23.0	18.1	5.1	9.3	3.0	3.5	2.8	3.6	2.1
7	......	......	21.0	23.2	17.7	4.8	8.2	2.9	3.3	2.6	3.7	2.3
8	......	......	20.4	23.2	17.1	4.6	7.0	2.8	3.0	2.4	3.7	2.3
9	......	......	18.0	23.0	16.2	4.4	6.0	2.7	2.8	2.2	3.7	2.2
10	......	......	14.4	22.8	15.0	4.2	6.5	2.7	2.6	1.9	3.8	2.2
11	......	......	12.5	22.2	13.2	4.0	7.5	2.7	2.4	1.8	3.8	2.2
12	......	......	11.7	21.0	12.8	3.8	8.2	2.7	2.2	1.7	3.9	2.2
13	......	......	11.7	19.7	13.6	3.6	7.9	3.2	2.1	1.7	4.0	2.2
14	......	......	12.2	17.2	14.8	3.4	7.8	3.3	2.1	1.7	4.1	2.1
15	......	......	15.5	14.8	15.2	3.3	7.8	3.4	2.0	1.7	4.1	2.1
16	......	......	15.6	12.4	15.5	3.3	9.8	3.4	2.0	1.7	4.0	2.0
17	......	......	16.6	11.8	16.4	4.3	10.9	5.7	2.0	1.6	3.8	1.9
18	......	......	17.2	11.6	17.1	4.9	10.4	5.8	2.3	1.5	3.7	1.9
19	......	......	17.8	11.9	17.3	5.0	9.5	5.3	2.5	1.4	3.5	1.9
20	10.8	......	18.2	11.9	17.0	5.2	8.3	4.9	2.6	1.8	3.4	1.9
21	12.7	......	18.7	12.3	16.5	5.9	7.8	5.3	2.6	2.0	3.3	2.0
22	14.4	......	19.3	12.5	15.9	6.0	7.7	6.0	2.6	2.1	3.3	2.1
23	15.1	......	19.9	12.5	15.4	5.8	8.6	8.2	2.6	2.2	3.1	2.2
24	15.6	......	20.5	11.9	14.2	5.5	8.8	9.6	2.4	2.2	3.0	2.2
25	16.3	......	21.1	11.1	12.2	5.2	7.8	10.0	2.3	2.2	2.9	2.2
26	16.7	......	21.6	10.7	9.6	4.8	6.7	9.3	3.6	2.1	2.8	2.1
27	17.0	17.2	22.1	13.3	7.9	4.3	6.0	8.1	5.2	2.1	2.7	2.0
28	15.0	18.1	22.4	15.4	7.1	3.9	5.8	6.6	4.8	2.1	2.6	1.9
29	14.8	18.3	22.6	15.6	7.2	3.7	5.6	5.3	4.7	2.1	2.5	1.8
30	14.2	......	22.7	16.5	7.8	3.5	5.1	5.1	4.6	2.1	2.4	1.8
31	13.0	......	22.6	......	7.2	......	4.7	5.0	......	2.1	......	1.8

NOTE.—River reported "frozen" Jan. 5-19 and Feb. 4-26. The Monthly Weather Review for January, 1912 (published by the United States Department of Agriculture), states: "The Wabash River was frozen from the 5th to the 19th, and a threatening gorge formed near Mount Carmel, Ill., during the last decade of the month, causing flood stages of water and some damage."

EMBARRASS RIVER NEAR OAKLAND, ILL.

Location.—At highway bridge about 2 miles northwest of Oakland, Ill., on the county-line road to Hindsboro and Arcola, in the northeastern part of T. 14 N., R. 10 E., about 5 miles below the mouth of Brush Creek.

Records available.—October 23, 1909, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—535 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—The section is at a pool; measurements to date indicate that the control has not changed.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of 1897 reached a height of about 24 feet by the present gage datum.

Point of zero flow.—Not determined. There was no flow past the bridge during a portion of the summer of 1908.

Winter flow.—Ice may affect the relation of gage height to discharge during portions of December, January, and February.

The following discharge measurement was made by P. S. Monk:

July 26, 1912: Gage height, 2.88 feet; discharge, 58 second-feet.

Daily gage height, in feet, of Embarrass River near Oakland, Ill., for 1912.

[Paul McDaniels, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.6	[a]4.6	10.8	12.0	9.3	4.4	3.5	3.0	2.4			2.0
2	5.4	[a]4.6	8.4	11.3	9.0	4.0	3.6	3.0	2.3			2.0
3	5.4	[a]4.6	7.0	11.0	8.9	3.7	3.8	3.1	2.5		2.0	2.0
4	4.9		6.0	10.8	8.6	3.5	4.0	3.0	2.5		2.1	1.9
5	4.9	4.2	5.7	10.4	9.0	3.3	4.0	2.9	2.4		2.3	1.95
6	5.1	4.2	5.2	9.2	9.6	3.3	4.1	2.8	2.4		2.3	1.95
7	5.0	4.0	5.3	8.0	10.4	3.3	4.0	2.9	2.3		2.4	1.9
8	[a]5.1	4.0	5.0	7.6	9.2	3.0	4.0	3.1	2.3		2.5	1.85
9	[a]5.2	4.0		7.4	8.9	3.0	3.8	3.1	2.4		2.5	1.85
10	[a]5.1	4.0	5.3	7.4	8.6	3.2	3.7	3.0	2.4		2.3	1.85
11	[a]5.1		5.0	6.9	8.7	3.2	3.9	3.0	2.4		2.2	1.8
12	[a]5.1	3.8	4.1	6.4	7.0	3.3	3.7	2.9	2.4		2.1	1.8
13	5.0	3.8	4.7	6.0	6.6	3.2	3.8	2.8	2.4		2.0	1.8
14	[a]5.0	3.8	6.2	6.3	6.2	3.4	3.6	2.8	2.3		1.95	1.8
15	4.9	3.8	12.8	6.5	6.0	3.4	3.55	2.7	2.3		1.9	1.8
16	4.0	4.0	14.2	6.4	5.3	3.4	3.3	2.7	2.3		1.9	1.8
17	4.4	4.4	15.5	7.8	5.8	3.7	3.0	2.6	2.2		1.9	1.9
18	6.6	6.0	14.8	8.8	5.0	4.8	3.1	2.7	2.3		1.8	1.9
19	9.0	8.8	14.6	8.0	4.9	5.6	3.0	2.8	2.4		1.8	1.9
20	11.0	9.5	14.4	8.3	4.9	5.0	2.9	3.4	2.4		1.85	1.9
21	13.0	8.4	14.2	9.6	4.8	4.6	2.9	4.3	2.4		1.8	1.9
22	10.7	7.1	13.6	9.4	4.7	4.0	2.9	5.6	2.5		1.7	1.9
23	7.6	6.5	12.0	9.2	4.9	3.8	2.85	4.2	2.5		1.7	1.9
24	8.6	5.4	12.6	8.4	4.8	3.8	2.85	3.4	2.4		1.7	1.9
25	8.8	7.0	12.4	8.4	4.6	3.6	2.85	3.0	2.3		1.7	1.95
26	8.2	13.0	12.3	9.1	4.4	3.5	2.85	2.9	2.2		1.6	1.95
27	8.0	16.0	13.0	10.0	4.3	3.5	2.85	2.8	2.2		1.6	1.95
28	[a]7.5	17.2	14.0	10.2	4.3	3.6	2.95	2.8	2.2		1.55	1.9
29	[a]6.0	15.3	14.6	11.1	4.7	3.6	3.1	2.5	2.2		1.5	1.85
30	[a]4.8		13.8	10.4	4.7	3.5	3.2	2.5	2.0		1.5	1.85
31	4.6		13.0		4.6		3.2	2.4				1.9

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–Feb. 28, Mar. 7–11. There may also have been some effect during December. Observer reported ice from 4 to 8 inches thick during January and from 5 to 9 inches thick during February and reported "some ice in river during most of time in December."

Daily discharge, in second-feet, of Embarrass River near Oakland, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	456	......	1,860	2,300	1,360	226	105	61	27	......	a 5	10
2	416	......	1,100	2,040	1,270	165	116	61	22	......	a 5	10
3	416	......	760	1,930	1,240	128	140	68	32	......	10	10
4	316	......	540	1,860	1,160	105	165	61	32	......	13	8
5	......	......	477	1,720	1,270	85	165	55	27	......	22	9
6	......	......	376	1,330	1,450	85	179	49	27	......	22	9
7	......	......	......	1,000	1,720	85	165	55	22	......	27	8
8	......	......	......	902	1,330	61	165	68	22	......	32	7
9	......	......	......	854	1,240	61	140	68	27	......	32	7
10	......	......	......	854	1,160	76	128	61	27	......	22	7
11	......	......	......	737	1,190	76	152	61	27	......	17	6
12	......	......	179	627	760	85	128	55	27	......	13	6
13	......	......	278	540	671	76	140	49	27	......	10	6
14	......	......	583	605	583	95	116	49	22	......	9	6
15	......	......	2,630	649	540	95	110	43	22	......	8	6
16	......	......	3,220	627	396	95	85	43	22	......	8	6
17	......	......	3,780	950	498	128	61	37	17	......	8	8
18	......	......	3,480	1,210	336	297	68	43	22	......	6	8
19	......	......	3,390	1,000	316	456	61	49	27	......	6	8
20	......	......	3,310	1,080	316	336	55	95	27	......	7	8
21	......	......	3,220	1,450	297	260	55	210	27	......	6	8
22	......	......	2,960	1,390	278	165	55	456	32	......	5	8
23	......	......	2,300	1,330	316	140	52	194	32	......	5	8
24	......	......	2,540	1,100	297	140	52	95	27	......	5	8
25	......	......	2,460	1,100	260	116	52	61	22	......	5	9
26	......	......	2,420	1,300	226	105	52	55	17	......	4	9
27	......	......	2,710	1,580	210	105	52	49	17	......	4	9
28	......	......	3,140	1,650	210	116.	58	49	17	......	3.5	8
29	......	3,700	3,390	1,970	278	116	68	32	17	......	3	7
30	......	......	3,050	1,720	278	105	76	32	10	......	3	7
31	......	......	2,710	......	260	......	76	27	......	......	......	8

a Estimated.

NOTE.—Daily discharge determined by means of a discharge rating curve well defined between 22 and 1,450 second-feet (gage heights 2.3 and 9.6 feet). Daily discharge Jan. 3 to 7 estimated, because of ice, from climatologic records and run-off in adjacent drainage areas.

Discharge Jan. 5–Feb. 28 and Mar. 7–11 estimated, because of ice, from climatologic records, daily gage heights, observer's notes, and discharge of adjacent drainage areas, as follows: Jan. 5–31, 340 second-feet; Feb. 1–28, 320 second-feet; Mar. 7–11, 250 second-feet.

These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution. Possibly also slight ice effect during December.

Monthly discharge of Embarrass River near Oakland, Ill., for 1912.

[Drainage area, 535 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	......	......	348	0.650	0.75	D.
February	......	......	437	.817	.88	D.
March	3,780	......	1,870	3.50	4.04	C.
April	2,300	540	1,250	2.34	2.61	A.
May	1,720	210	701	1.31	1.51	A.
June	456	61	139	.260	.29	B.
July	179	52	99.7	.186	.21	B.
August	456	27	77.1	.144	.17	B.
September	32	10	24.1	.045	.05	C.
October	......	......	......	......	......	
November	32	3	10.8	.020	.02	D.
December	10	6	7.8	.015	.02	D.

NOTE.—See footnotes to table of daily discharge.

EMBARRASS RIVER AT STE. MARIE, ILL., 1911.

Location.—At highway bridge at the north end of Main Street, Ste. Marie, Ill., about 150 yards downstream from the Cincinnati, Hamilton & Dayton Railway bridge and 2½ miles upstream from the mouth of Hickory (or North Fork) Creek.

Records available.—October 20, 1909, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—1,540 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Shifting; section is at a pool, and measurements to date indicate that the point of control has remained unchanged.

Discharge measurements.—Made from downstream side of highway bridge at ordinary stages, and during high water made also from the downstream side of five wooden trestles on the Cincinnati, Hamilton & Dayton Railway northwest of the highway bridge.

Floods.—The flood of the spring of 1908 reached a height of 22.5 feet by the present gage datum.

Winter flow.—Relation of gage height to discharge may be affected by ice during portions of December, January, and February.

The following discharge measurement was made by P. S. Monk: August 17, 1912: Gage height, 4.43 feet; discharge, 420 second-feet.

Daily gage height, in feet, of Embarrass River at Ste. Marie, Ill., for 1912.

[Val. C. Wuerth, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.5	6.2	17.1	17.9	17.2	5.4	3.6	3.8	3.5	2.3	2.7	2.3
2	7.2	5.8	16.3	17.2	16.2	5.3	5.0	3.6	3.3	2.3	3.3	2.3
3	6.2	5.5	15.3	18.1	15.4	8.2	7.2	3.4	3.1	......	3.6	2.3
4	5.8	5.3	11.1	18.1	15.0	5.8	12.2	3.4	3.1	......	3.2	2.3
5	6.2	5.0	8.0	17.2	14.2	5.3	11.8	3.3	3.0	......	2.9	2.5
6	5.8	4.8	7.2	15.7	12.3	4.9	6.0	3.2	3.4	......	2.6	2.5
7	5.8	4.7	6.8	13.7	13.2	4.7	5.9	3.1	3.0	......	2.7	2.4
8	5.8	4.7	6.4	12.0	11.9	4.3	5.6	3.4	2.8	......	2.7	2.3
9	5.8	4.6	6.2	10.6	11.1	4.3	5.5	3.3	2.7	......	3.1	2.3
10	6.2	4.4	6.0	9.6	9.9	4.1	5.5	4.1	2.6	......	3.1	2.2
11	6.2	4.4	6.2	9.0	9.0	4.0	6.3	8.4	2.6	......	3.0	2.2
12	6.0	4.4	6.3	8.3	10.0	4.0	13.3	4.4	2.5	......	3.0	2.3
13	5.6	4.3	7.7	10.5	10.9	3.8	7.2	5.4	2.5	......	3.0	2.3
14	5.4	4.3	13.3	11.0	10.0	3.8	6.4	5.8	2.5	......	4.0	2.3
15	......	4.2	16.7	8.9	8.8	3.8	13.2	9.1	2.4	......	3.2	2.4
16	......	4.2	17.7	7.6	11.4	4.2	14.4	5.2	2.5	......	2.9	2.3
17	......	4.3	18.0	7.7	10.5	5.2	14.0	4.2	2.5	......	2.8	2.2
18	......	4.3	17.8	11.5	9.8	5.7	10.1	4.3	2.6	......	2.6	2.2
19	......	5.0	17.6	10.5	8.0	5.3	10.3	4.2	2.5	......	2.6	2.2
20	......	9.0	17.7	8.8	7.3	6.5	7.2	4.7	2.7	......	2.6	2.2
21	14.1	7.7	18.0	9.0	6.9	6.5	6.3	9.4	2.6	......	2.5	2.2
22	12.5	6.5	18.0	9.0	6.4	6.4	5.6	9.4	2.6	......	2.5	2.1
23	11.6	6.3	18.0	7.6	6.3	5.3	5.4	6.5	2.4	......	2.5	2.1
24	11.4	6.4	17.9	6.9	5.9	5.0	5.1	6.7	2.4	......	2.4	2.1
25	10.6	6.2	17.3	7.0	5.7	4.6	4.8	5.6	2.5	......	2.3	2.1
26	9.5	15.6	16.7	6.0	5.7	4.2	4.5	5.0	2.5	......	2.3	2.1
27	9.4	17.6	17.0	16.4	5.4	4.1	4.2	4.5	2.4	......	2.3	2.1
28	9.0	18.2	17.5	16.7	5.4	4.0	3.9	4.2	2.3	......	2.3	2.2
29	8.3	18.1	18.2	16.8	6.3	3.8	4.2	3.9	2.3	......	2.3	2.3
30	7.3	......	18.4	17.4	5.7	3.6	5.4	4.2	2.3	......	2.3	2.2
31	6.7	......	18.4	......	5.5	......	4.0	3.8	......	......	......	2.2

NOTE.—Gage heights Jan. 7, 8, and 9, and Jan. 21–Feb. 16 to top of ice. Relation of gage height to discharge affected by ice about Jan. 4–Feb. 17 and Dec. 11–29. Observer reported ice to be from 3 to 6 inches in thickness during January.

Daily discharge, in second-feet, of Embarrass River at Ste. Marie, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,720		5,200	5,530	5,240	656	275	308	259	129	160	129
2	1,340		4,870	5,240	4,830	630	555	275	229	129	229	129
3	893		4,460	5,610	4,500	1,600	1,240	244	202		275	129
4			2,740	5,610	4,340	769	3,190	244	202		215	129
5			1,530	5,240	4,010	630	3,030	229	190		179	144
6			1,240	4,630	3,230	532	830	215	244		152	144
7			1,100	3,810	3,600	487	799	202	190		160	136
8			959	3,110	3,070	403	711	244	169		160	129
9			893	2,540	2,740	403	683	229	160		202	129
10			830	2,140	2,260	364	683	364	152		202	122
11			893	1,900	1,900	345	926	1,680	152		190	
12			926	1,640	2,300	345	3,640	423	144		190	
13			1,420	2,500	2,660	308	1,240	656	144		190	
14			3,640	2,700	2,300	308	959	769	144		345	
15			5,040	1,870	1,830	308	3,600	1,940	136		215	
16			5,450	1,380	2,860	383	4,090	604	144		179	
17			5,570	1,420	2,500	604	3,930	383	144		169	
18		403	5,490	2,900	2,220	740	2,340	403	152		152	
19		555	5,410	2,500	1,530	630	2,420	383	144		152	
20		1,900	5,450	1,830	1,270	992	1,240	487	160		152	
21		1,420	5,570	1,900	1,130	992	926	2,060	152		144	
22		992	5,570	1,900	959	959	711	2,060	152		144	
23		926	5,570	1,380	926	630	656	992	136		144	
24		959	5,530	1,130	799	555	579	1,060	136		136	
25		893	5,280	1,160	740	465	509	711	144		129	
26		4,590	5,040	830	740	383	444	555	144		129	
27		5,410	5,160	4,910	656	364	383	444	136		129	
28		5,650	5,360	5,040	656	345	326	383	129		129	
29		5,610	5,650	5,080	926	308	383	326	129		129	
30			5,730	5,320	740	275	656	383	129		129	122
31			5,730		683		345	308				122

NOTE.—Daily discharge determined by means of a discharge rating curve poorly defined below 160 second-feet (gage height 2.7 feet); well defined between 169 and 1,870 second-feet (gage heights 2.8 and 8.9 feet); fairly well defined between 1,900 and 4,750 second-feet (gage heights 9 and 16 feet). Above 4,750 second-feet (gage height 16.0 feet) curve is extended as a tangent which starts at 2,700 second-feet (gage height 11.0 feet).

Discharge, Jan. 4–Feb. 17, and Dec. 11–29, estimated, because of ice, from climatologic records, gage heights, observer's notes, and discharge of adjacent drainage areas, as follows: Jan. 4–31, 900 second-feet; Feb. 1–17, 800 second-feet; Dec. 11–29, 100 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Embarrass River at Ste. Marie, Ill., for 1912.

[Drainage area, 1,540 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			940	0.610	0.70	D.
February	5,650		1,190	.773	.83	D.
March	5,730	830	3,980	2.58	2.97	B.
April	5,610	830	3,090	2.01	2.24	A.
May	5,240	656	2,200	1.43	1.65	A.
June	1,600	275	557	.362	.40	A.
July	4,090	275	1,360	.883	1.02	A.
August	2,060	202	631	.410	.47	B.
September	259	129	162	.105	.12	C.
October						
November	345	129	174	.113	.13	C.
December	144		112	.073	.08	D.

NOTE.—See footnotes to table of daily discharge.

EAST BRANCH OF WHITE RIVER AT SHOALS, IND.

Location.—At highway bridge between East and West Shoals, Ind., a short distance above the Baltimore & Ohio Southwestern Railroad bridge.

Records available.—June 25, 1903, to July 21, 1906; October 12, 1908, to December 31, 1912.

Drainage area.—4,900 square miles.

Gage.—Standard chain gage attached to bridge. The gage datum was raised 61 feet on January 1, 1909, to agree with that used by the United States Weather Bureau.

Channel.—Solid rock; permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—Maximum gage height as published by the United States Weather Bureau was 34.1 feet March 30, 1904; flood of March, 1897, said to have been 1 to 1½ feet higher.

Winter flow.—Relation of gage height to discharge affected by ice during severe winters during portions of January and February. In ordinary winters there is little if any ice at the station.

Accuracy.—This station was not visited during 1912, and the data are published on the assumption that no changes have occurred during the year in the gage nor in the relation of gage height to discharge. The discharge rating curve used is the same as that used for 1911, is based on discharge measurements made during 1909, 1910, and 1911 and the form of previous curves, reverses at about 3,930 second-feet (gage height 4.5 feet), is drawn as a tangent above 17,000 second-feet (gage height, 11.0 feet), and is fairly well defined.

Cooperation.—Gage readings are furnished by the United States Weather Bureau part of the year.

Daily gage height, in feet, of East Branch of White River at Shoals, Ind., for 1912.

[G. H. Rowe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.8	8.9	21.5	18.8	17.8	5.0	3.5	2.75	4.15	3.4	3.0	2.6
2	7.7	8.8	22.8	19.4	16.9	4.6	3.65	2.9	4.0	3.35	2.8	2.65
3	8.2	7.4	23.7	20.4	15.7	4.3	3.55	2.8	3.7	3.06	2.85	3.1
4	7.6	6.6	22.5	21.0	13.9	4.1	3.8	2.7	3.5	3.05	2.9	2.65
5	6.6	5.3	17.4	18.4	11.1	3.9	4.2	2.8	3.35	2.9	2.95	2.5
6	5.3	4.6	9.5	17.2	10.7	3.8	4.15	2.65	3.2	2.9	3.0	2.6
7	4.4	4.5	6.5	17.6	10.1	3.8	4.15	2.75	3.1	2.9	3.1	2.8
8	4.1	4.0	5.7	15.5	10.5	3.7	5.1	2.8	2.9	2.95	3.15	2.7
9	4.4	4.1	6.7	12.8	9.9	3.6	5.7	2.35	3.0	2.9	3.2	2.9
10	4.5	4.3	7.9	10.4	8.5	3.5	5.2	2.85	3.05	2.7	3.0	3.15
11	4.5	5.1	8.8	8.8	7.9	3.5	5.0	2.95	3.15	2.55	2.95	3.15
12	4.5	5.0	8.6	7.6	12.3	3.4	4.7	2.7	2.9	2.55	3.2	3.1
13	4.5	4.2	8.7	6.7	15.1	3.4	4.6	3.3	2.8	2.65	2.9	2.85
14	4.5	4.8	8.9	6.2	14.0	3.4	4.5	3.6	2.7	2.6	2.85	2.55
15	4.0	3.8	10.6	6.2	13.7	3.7	4.55	3.85	2.65	2.7	3.0	2.5
16	4.0	3.8	13.2	6.1	12.8	3.9	4.7	5.0	2.45	2.55	2.85	2.7
17	4.4	3.8	13.2	6.2	13.0	3.8	4.7	5.8	2.75	2.8	2.95	2.9
18	4.0	4.0	14.0	7.6	12.8	3.6	4.4	5.5	2.75	2.65	3.05	2.5
19	8.4	4.3	14.5	9.2	11.4	3.7	4.4	4.7	2.9	2.7	3.15	2.6
20	12.2	5.2	14.2	10.6	10.9	3.7	4.5	4.2	3.0	2.65	3.0	2.75
21	11.6	6.1	13.9	10.1	9.3	3.7	4.7	4.8	3.0	2.5	3.0	2.8
22	12.1	7.2	14.8	9.3	7.6	3.9	5.3	5.6	2.75	2.95	3.0	2.75
23	16.9	8.0	15.0	8.3	6.2	3.7	4.95	6.4	3.2	2.65	2.9	2.7
24	12.3	7.8	15.8	7.5	5.5	3.5	4.9	6.1	3.1	2.85	2.7	2.6
25	14.0	7.2	17.6	7.0	5.1	3.5	4.75	5.4	3.15	2.9	2.6	2.55
26	12.9	11.2	18.4	6.4	4.8	3.5	4.5	4.9	3.7	2.9	2.95	2.7
27	9.2	18.6	18.9	13.3	4.6	3.4	4.1	4.45	4.1	2.65	2.95	2.75
28	7.9	19.1	19.0	17.0	4.4	3.4	3.65	4.25	4.0	2.6	2.85	2.75
29	8.0	19.0	18.9	17.0	4.7	3.4	3.5	4.15	3.7	2.9	2.6	2.6
30	8.6	......	19.7	17.2	4.7	3.4	3.3	4.6	3.45	2.75	2.6	2.65
31	8.8	......	19.0	......	4.8	......	2.7	4.5	......	2.95	......	2.6

NOTE.—No record of ice kept by observer. Relation of gage height to discharge probably affected by ice about Jan. 7-23 and Feb. 6-19.

Daily discharge, in second-feet, of East Branch of White River at Shoals, Ind., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,250	13,400	32,800	28,700	26,400	5,210	1,740	785	3,120	1,580	1,040	650
2	11,100	13,200	34,700	29,600	25,800	4,230	2,000	930	2,760	1,500	830	695
3	12,100	10,500	36,000	31,100	24,000	3,480	1,820	830	2,100	1,100	880	1,160
4	10,900	8,820	34,200	32,000	21,400	3,000	2,310	740	1,740	1,100	930	695
5	8,820	5,910	26,600	28,100	17,200	2,530	3,240	830	1,500	930	985	570
6	5,910	....	14,500	26,300	16,500	2,310	3,120	695	1,290	930	1,040	650
7	....	....	8,600	26,900	15,600	2,310	3,120	785	1,160	930	1,160	830
8	....	....	6,830	23,800	16,200	2,100	5,450	830	930	985	1,220	740
9	....	....	9,040	19,700	15,200	1,910	6,830	465	1,040	930	1,290	930
10	....	....	11,500	16,000	12,700	1,740	5,680	880	1,100	740	1,040	1,220
11	....	....	13,200	13,200	11,500	1,740	5,210	985	1,220	610	985	1,220
12	....	....	12,900	10,900	19,000	1,580	4,480	740	930	610	1,290	1,160
13	....	....	13,000	9,040	23,200	1,580	4,230	1,430	830	695	930	880
14	....	....	13,400	7,940	21,500	1,580	3,980	1,910	740	650	880	610
15	....	....	16,400	7,940	21,000	2,100	4,100	2,420	695	740	1,040	570
16	....	....	20,300	7,720	19,700	2,530	4,480	5,210	535	610	880	[a] 740
17	....	....	20,300	7,940	20,000	2,310	4,480	7,060	785	830	985	930
18	....	....	21,500	10,900	19,700	1,910	3,730	6,370	785	695	1,100	570
19	....	....	22,200	14,000	17,600	2,100	3,730	4,480	930	740	1,220	650
20	....	5,680	21,800	16,400	16,800	2,100	3,980	3,240	1,040	695	1,040	785
21	....	7,720	21,400	15,600	14,200	2,100	4,480	4,730	1,040	570	1,040	830
22	....	10,100	22,700	14,200	10,900	2,530	5,910	6,600	785	985	1,040	785
23	....	11,700	23,000	12,300	7,940	2,100	5,090	8,380	1,290	695	930	740
24	19,000	11,300	24,200	10,700	6,370	1,740	4,970	7,720	1,160	880	740	650
25	21,500	10,100	26,900	9,670	5,450	1,740	4,600	6,140	1,220	930	650	610
26	19,800	17,300	28,100	8,380	4,730	1,740	3,980	4,970	2,100	930	985	740
27	14,000	28,400	28,800	20,400	4,230	1,580	3,000	3,860	3,000	695	985	785
28	11,500	29,200	29,000	26,000	3,730	1,580	2,000	3,360	2,760	650	880	785
29	11,700	29,000	28,800	26,000	4,480	1,580	1,740	3,120	2,100	930	650	650
30	12,900	....	30,000	26,300	4,480	1,580	1,430	4,230	1,660	785	650	695
31	13,200	....	29,000	....	4,730	....	740	3,980	....	985	....	650

[a] Dec. 16 observer reported: "Rise evidently due to gates in dam at Williams."

NOTE.—Discharge Jan. 7-23 and Feb. 6-19 estimated, because of ice, from climatologic records and daily gage heights, as follows: Jan. 7-23, 3,500 second-feet; Feb. 6-19, 1,500 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution. See also "Accuracy" in station description.

Monthly discharge of East Branch of White River at Shoals, Ind., for 1912.

[Drainage area, 4,900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	7,780	1.59	1.83	D.
February	29,200	....	8,050	1.64	1.77	D.
March	36,000	6,830	22,000	4.49	5.18	C.
April	32,000	7,720	17,900	3.65	4.07	B.
May	26,400	3,730	14,600	2.98	3.44	A.
June	5,210	1,580	2,220	.453	.51	B.
July	6,830	740	3,730	.761	.88	A.
August	8,380	465	3,180	.649	.75	A.
September	3,120	535	1,410	.288	.32	B.
October	1,580	570	859	.175	.20	B.
November	1,290	650	977	.199	.22	B.
December	1,220	570	780	.159	.18	B.
The year	36,000	....	6,970	1.42	19.35	

NOTE.—See "Accuracy" in station description and footnotes to table of daily discharge.

LITTLE WABASH RIVER NEAR CLAY CITY, ILL.

Location.—At the Baltimore & Ohio Southwestern Railroad bridge about 2 miles east of Clay City, Ill., and about 5 miles above the mouth of Big Muddy Creek.

Records available.—October 3, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—808 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Location of point of control not known.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of February 8, 1909, reached a height of 23.7 feet on the gage.

Winter flow.—Ice may affect the relation between gage height and discharge during parts of December, January, and February.

Remarks.—The station is at the toe of a horseshoe bend in the river, and the ground inside the bend along the railroad is very low. During high water the Little Wabash overflows into Little Muddy Creek and in extreme high water into Big Muddy Creek, forming at such times a sheet of water 4 miles wide along the railroad; at times, however, because of local storms causing relatively higher stages on Little and Big Muddy creeks than on the Little Wabash, the overflow is reversed, that is, from the creeks into the river. The high-water discharge of Little Wabash River at this station can not, therefore, be determined. Nine discharge measurements were made at this station during 1909–1912, but no estimates of discharge have been published because of the impossibility of determining the high-water discharge. There was no overflow at the station at the gage height (13.35 feet) of the discharge measurement made August 16, 1912, and the cross section at the gaging section indicates that there will probably be no flow in the flood channel one-fourth mile east of the main channel below gage height, about 15 feet. When the discharge measurement was made March 4, 1910, there was a large amount of overflow, but the lowest stage of such overflow could not then be determined. At what stage overflow above the station occurs can be ascertained only by observation or an examination of the intervening topography.

Discharge below the probable stage of overflow may be estimated from the records available at the discretion of those using the data. The accuracy of such records will be only fair.

The following discharge measurement was made by P. S. Monk:

August 16, 1912: Gage height, 13.35 feet; discharge, 1,110 second-feet. At the time of this discharge measurement all the flow was in the main channel.

Daily gage height, in feet, of Little Wabash River near Clay City, Ill., for 1912.

[Wm. F. Davis and J. D. Evans, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.0	9.1	19.4	18.8	18.8	9.0	6.9	10.2	7.0	6.0	6.3	6.1
2	11.8	8.8	19.0	18.8	18.5	7.6	6.45	8.0	6.9	6.0	6.5	6.1
3	9.9	8.1	......	18.9	18.5	9.6	6.5	7.4	6.8	6.0	8.5	6.1
4	9.2	7.9	13.8	18.5	17.6	12.2	9.6	7.15	6.7	6.0	8.0	6.1
5	9.2	7.25	10.8	18.5	14.5	9.3	18.0	7.8	7.2	6.0	7.8	6.1
6	9.2	6.85	9.1	18.1	12.0	8.0	18.0	6.75	6.7	6.0	7.5	6.1
7	8 8	6.3	8.8	16.3	10.4	7.2	13.6	6.7	6.6	5.9	7.0	6.1
8	8.6	6.15	8.8	12.0	11.6	6.95	10.1	6.7	6.5	5.9	6.8	6.1
9	8.0	6.15	9.2	10.3	9.6	6.8	9.2	8.8	6.4	5.9	6.6	6.1
10	7.7	6.15	9.8	9.5	8.8	6.6	8.4	8.2	6.3	5.9	6.6	6.1

Daily gage height, in feet, of Little Wabash River near Clay City, Ill., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	7.55	6.15	10.3	8.8	8.0	6.5	8.4	14.0	6.2	5.9	6.6	6.1
12	[a] 6.7	6.15	11.0	8.6	9.8	6.4	10.0	11.2	6.2	5.9	6.6	6.1
13	6.7	6.15	11.8	8.4	10.0	6.25	11.2	9.2	6.2	5.9	6.55	6.1
14	6.7	6.15	14.8	15.0	9.6	6.3	12.1	11.8	6.1	5.9	6.5	6.1
15	6.7	6.15	18.1	14.0	9.4	6.2	14.2	15.8	6.1	5.9	7.8	6.05
16	[a] 6.6	6.15	18.5	11.2	9.0	6.15	17.2	12.3	6.0	5.9	7.3	6.05
17	6.6	6.15	18.5	9.2	8.4	6.2	17.8	11.6	6.0	5.9	6.9	6.0
18	8.3	6.5	18.6	9.4	8.1	8.8	18.0	11.8	6.0	5.9	6.7	6.0
19	13.8	8.0	18.7	15.5	9.0	9.6	16.2	12.2	6.0	5.9	6.5	6.0
20	16.8	10.1	18.8	17.2	8.5	8.6	15.0	10.0	5.9	5.9	6.4	6.0
21	18.0	11.5	18.9	14.8	8.0	7.8	11.4	15.2	5.9	5.9	6.3	6.0
22	17.8	13.0	18.6	12.6	7.4	7.5	9.2	17.9	6.0	5.9	6.2	6.0
23	15.0	10.5	18.5	11.4	7.3	7.15	10.5	18.2	6.1	6.0	6.2	6.0
24	12.0	9.0	18.5	15.6	7.15	7.1	10.1	16.6	6.1	6.0	6.2	6.0
25	12.0	8.7	18.5	....	7.0	7.05	9.8	10.3	6.2	6.0	6.2	6.0
26	11.6	13.9	18.3	11.1	6.95	7.15	8.1	8.4	6.2	6.0	6.2	6.0
27	11.2	18.4	17.8	18.1	7.0	7.0	7.25	7.8	6.1	6.0	6.15	6.0
28	11.0	18.6	18.4	....	7.9	6.45	7.1	7.5	6.0	6.0	6.1	6.0
29	10.0	18.8	18.6	18.4	9.0	6.5	7.8	7.4	5.9	6.0	6.1	6.0
30	9.8	....	18.8	18.6	10.4	6.35	13.2	7.2	5.8	6.0	6.1	6.0
31	9.4	....	19.0	....	9.6	....	12.1	7.1	....	6.0	....	6.0

[a] Gage height 7.5 feet to top of ice.

NOTE.—Gage heights to top of ice Jan. 4–11. Relation of gage height to discharge probably affected by ice about Jan. 4–18 and Feb. 4–17. Observer reported ice from 2 to 9 inches thick Jan. 4–17, and from 5 to 8 inches in thickness Feb. 5–17. Observer reported "rain and thaw cause of rise" on Jan. 19 and "ice gone" on Feb. 18. On or about Sept. 30 the gage box was struck by a loose brake rod of a passing train, and as a result readings from that date to Dec. 31 may be in error. The gage was repaired by the observer, who reports that the gage readings would be only slightly affected because of the accident.

LITTLE WABASH RIVER NEAR GOLDEN GATE, ILL.

Location.—At Southern Railway bridge about 1 mile west of Golden Gate, Ill., and 1 mile below the mouth of Elm Creek.

Records available.—August 17, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—1,780 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Location of control not known.

Discharge measurements.—Made from downstream side of the bridge, and in high water, also from downstream side of three wooden trestles east of the gaging station.

Floods.—The flood of May, 1908, reached a height of about 29.2 feet on the present gage datum.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

Accuracy.—Backwater affects the relation of gage height to discharge at this station and, although 21 measurements of discharge have been made at this point during 1908–1912, no reliable estimates of discharge can be made.

The following discharge measurement was made by P. S. Monk:

August 13, 1912: Gage height, 9.41 feet; discharge, 1,250 second-feet.

Daily gage height, in feet, of Little Wabash River near Golden Gate, Ill., for 1912.

[Ben Chalcraft, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.8	8.1	21.8	24.8	20.8	11.0	3.6	7.9	5.8	2.5	3.4	2.5
2	10.2	7.8	22.2	25.3	21.2	9.3	2.7	8.8	4.0	2.4	5.2	2.7
3	9.9	7.2	22.0	25.6	21.4	7.2	3.4	7.3	3.6	2.4	7.5	2.7
4	8.8	6.8	21.4	25.6	21.7	6.8	[a]16.1	5.1	3.2	2.2	7.1	2.6
5	7.4	6.4	22.1	25.5	22.4	5.4	18.4	4.8	3.1	2.1	6.8	2.6
6	6.7	6.4	22.1	25.8	22.2	8.4	24.4	4.5	3.0	....	7.4	2.5
7	6.1	5.8	21.8	25.0	21.8	6.8	24.2	4.4	3.0	....	8.1	2.5
8	5.8	4.6	21.4	24.9	21.0	4.3	23.8	3.9	3.0	....	8.0	2.5
9	5.2	3.9	20.2	24.2	18.9	3.9	23.3	3.4	3.0	....	7.2	2.4
10	5.0	3.6	18.9	23.6	15.7	3.8	23.0	3.3	2.9	....	5.5	2.3
11	4.9	3.5	17.5	22.5	10.2	3.6	22.0	4.3	2.9	....	5.0	2.3
12	4.8	3.5	15.8	21.2	14.3	3.1	21.1	6.2	2.6	....	4.8	2.3
13	4.8	3.4	16.5	19.5	8.1	3.1	17.8	8.1	2.6	....	5.5	2.3
14	4.6	3.3	17.2	17.8	9.2	3.1	14.4	8.3	2.5	....	5.0	2.2
15	4.6	3.3	19.1	14.3	9.0	3.0	10.0	8.6	2.7	....	4.2	2.2
16	4.6	3.1	19.9	12.1	8.6	3.2	9.1	9.6	2.8	....	4.0	2.2
17	5.8	3.8	20.5	11.5	9.2	12.4	11.1	10.7	3.2	....	3.9	2.3
18	8.4	4.5	20.9	11.1	9.8	14.8	12.2	9.5	3.6	....	3.6	2.4
19	11.2	4.9	21.3	10.6	9.0	10.4	13.8	6.8	3.9	....	3.4	2.3
20	13.8	5.3	22.1	11.2	7.4	8.2	14.0	11.2	3.0	....	3.2	2.3
21	15.8	6.2	22.7	11.9	5.6	7.3	14.6	11.7	3.8	....	3.1	2.2
22	16.1	9.4	23.4	12.4	5.2	6.4	14.0	12.4	4.1	....	3.0	2.3
23	16.4	14.3	23.9	12.0	4.8	5.8	11.3	13.3	3.9	....	3.0	2.3
24	16.6	16.2	24.2	9.8	4.5	3.7	9.3	14.0	3.5	....	3.0	2.3
25	16.7	19.3	24.4	9.4	4.4	3.5	7.2	15.9	3.9	....	2.9	2.4
26	16.4	16.5	24.5	15.7	4.5	3.2	7.5	16.1	6.0	....	2.9	2.4
27	14.6	19.1	24.4	19.3	5.1	3.8	6.3	16.2	4.9	....	2.9	2.3
28	14.0	20.2	24.3	14.9	5.8	4.5	4.1	15.5	3.6	....	2.8	2.3
29	13.7	21.6	24.5	18.7	7.2	4.2	2.9	12.3	3.0	....	2.6	3.4
30	12.6	....	24.6	19.2	9.7	4.3	8.1	8.8	2.7	....	2.6	3.5
31	11.2	....	24.6	....	11.2	....	4.8	6.4	....	2.1	....	3.4

[a] Rise of 4.6 feet in one hour reported by observer July 4.

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 4–17 and Feb. 4–20. Observer reported ice 3 to 3½ inches thick from Jan. 5–12 and 5 inches thick on Feb. 14. Snow to a depth of 7 inches reported on the ice Jan. 12.

LITTLE WABASH RIVER AT CARMI, ILL.

Location.—At highway bridge at northeast edge of Carmi, Ill., about one-fourth mile below the Big Four and Louisville & Nashville Railroad bridges, and about 4½ miles below the mouth of Skillet Fork River.

Records available.—October 9, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—3,090 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Location of control not known.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The following high-water marks have been preserved: 1875, 33.5 feet; about 1895, 34.0 feet; 1897, 34.5 feet; 1898, 36.0 feet; all based on present gage datum. These gage heights are authentic, but there is a possibility that some of the dates are erroneous.

Winter flow.—Ice does not affect the flow in ordinary winters.

Accuracy.—Backwater exists at this station and reliable estimates of discharge can not be made.

The following discharge measurement was made by P. S. Monk:

August 12, 1912: Gage height, 3.50 feet; discharge, 732 second-feet.

Daily gage height, in feet, of Little Wabash River at Carmi, Ill., for 1912.

[Noah Weigant, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.0	9.4	20.7	27.7	21.4	8.8	2.35	4.2	3.0	....	2.0	2.0
2	6.9	7.0	21.1	28.0	21.8	7.8	2.35	6.2	2.6	....	2.5	2.0
3	7.4	5.3	21.3	28.4	22.2	6.5	2.45	6.6	2.4	....	3.25	2.0
4	7.0	5.7	21.5	28.6	22.5	4.2	11.5	5.0	2.25	....	4.2	2.0
5	7.0	5.0	21.6	28.8	22.5	3.1	19.2	4.4	2.2	....	4.2	2.0
6	7.1	4.3	21.8	28.8	22.2	3.2	19.5	2.7	2.15	....	4.8	2.05
7	6.95	3.6	21.7	28.9	21.6	3.2	20.0	2.45	2.15	....	5.2	2.05
8	6.20	3.3	21.8	28.8	20.7	3.05	21.0	2.3	2.1	....	6.1	2.05
9	5.80	3.0	22.0	28.6	19.2	2.65	21.2	2.25	2.1	....	5.8	2.0
10	5.55	2.9	21.2	28.0	17.0	2.45	20.9	2.35	2.05	....	5.0	2.0
11	[a]5.05	2.8	20.1	27.4	13.9	2.3	20.5	2.80	2.0	....	4.2	2.0
12	4.55	2.65	19.4	26.7	10.4	2.2	19.8	3.0	2.0	....	3.4	2.0
13	4.45	2.55	18.8	25.7	8.4	2.1	18.8	5.1	1.95	....	3.6	1.95
14	4.35	2.4	18.4	24.2	8.2	2.1	16.5	5.4	1.95	....	4.2	1.95
15	4.40	2.3	19.6	22.6	8.3	1.95	12.8	5.0	2.0	....	3.25	1.95
16	4.40	2.25	19.5	20.7	7.3	2.05	7.8	4.4	2.05	....	3.05	1.95
17	4.40	2.2	19.3	17.2	7.0	7.0	6.2	4.2	2.0	....	2.8	1.95
18	5.00	2.2	19.6	14.3	7.4	13.4	7.8	4.0	2.05	....	2.75	1.95
19	9.45	2.3	20.2	11.2	7.8	14.0	7.8	3.6	2.2	....	2.65	1.95
20	10.20	3.0	20.8	9.6	7.0	12.3	8.0	6.8	2.2	....	2.55	1.95
21	11.35	3.25	21.8	8.0	6.6	11.4	8.6	8.4	2.25	....	2.45	1.95
22	[b]12.5	3.45	22.7	10.4	6.2	10.9	8.9	10.6	2.3	....	2.35	1.95
23	13.8	4.3	23.3	10.8	5.6	10.4	8.5	10.8	2.55	....	2.3	1.95
24	14.6	5.2	24.4	8.7	4.8	9.3	6.6	10.0	2.55	....	2.2	1.95
25	14.7	6.5	25.0	6.4	4.4	9.0	4.8	10.0	3.05	....	2.15	1.95
26	14.4	18.6	25.4	15.6	3.2	7.8	4.1	9.7	7.8	....	2.1	1.95
27	14.0	20.0	25.8	20.8	3.3	5.8	4.0	9.5	5.2	....	2.1	1.95
28	13.3	19.4	26.2	20.5	3.9	4.0	3.5	8.6	3.4	....	2.05	1.95
29	16.0	19.4	27.0	20.8	5.4	4.0	3.25	7.7	2.7	....	2.05	1.95
30	14.6	....	27.4	21.0	6.9	3.4	2.70	6.0	2.2	1.90	2.05	2.0
31	11.8	....	27.4	....	8.2	....	2.75	4.6	....	....	....	2.0

[a] Gage height 5.15 feet to top of ice. [b] Gage height 12.55 feet to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5–22. Gage heights Jan 7–10 and 12–21 to top of ice.

SKILLET FORK RIVER NEAR WAYNE CITY, ILL.

Location.—At Southern Railway bridge 1 mile east of Wayne City, Ill., about 4 miles below the mouth of Horse Creek.

Records available.—August 16, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—481 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Practically permanent; rough; remains of rock dam at section. Point of control at section.

Discharge measurements.—Made from downstream side of bridge, and in high water also from downstream side of wooden railroad trestle about 1 mile east of main channel. Low-water measurements are made about 600 feet below regular section by wading or from a boat.

Floods.—Maximum gage height since establishment of gage, 21.8 feet, on March 11, 1909. No records previous to establishment of gage are available.

Point of zero flow.—A determination by leveling October 28, 1911, indicates that there would be no flow past the gage if the river stage were to fall to about 1.5 feet by the gage datum.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

The following discharge measurement was made by P. S. Monk:

August 14, 1912: Gage height, 3 feet; discharge, 54.5 second-feet. This measurement was made by wading at a section just above the bridge.

Daily gage height, in feet, of Skillet Fork River near Wayne City, Ill., for 1912.

[Geo. A. Johnson and J. C. Taylor, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.5	5.2	19.5	19.1	16.7	4.9	2.5	8.9	2.4	2.4	3.1	2.3
2	6.3	3.7	16.5	15.0	8.6	3.4	4.0	5.2	2.4	......	4.7	2.4
3	5.1	3.6	8.2	18.9	5.0	3.4	3.4	3.6	2.4	......	3.2	2.4
4	4.2	3.3	6.5	18.9	3.9	3.0	4.0	2.9	2.3	......	2.8	2.4
5	4.0	3.0	5.9	18.1	3.5	2.9	5.7	2.7	2.3	......	2.6	2.4
6	3.7	2.8	4.6	11.5	3.0	2.8	13.2	2.7	2.6	......	2.9	2.5
7	3.5	2.7	4.9	5.9	2.9	2.7	15.2	2.6	2.5	......	7.3	2.5
8	3.1	2.7	5.6	5.0	2.9	2.7	12.4	2.6	2.4	......	6.0	2.4
9	3.1	2.7	9.7	4.4	3.0	2.7	13.9	2.6	2.3	......	3.7	2.4
10	3.1	[b] 2.25	10.2	4.0	2.9	2.7	11.0	2.9	2.3	......	2.8	2.4
11	3.1	[b] 2.5	10.2	3.8	3.3	2.7	11.7	2.8	2.3	......	2.7	2.4
12	3.1	2.7	11.0	3.4	10.4	2.4	8.6	3.2	2.3	......	2.7	2.4
13	[a] 2.5	2.6	12.1	3.3	9.1	2.3	5.5	3.4	2.3	......	2.6	2.4
14	3.1	2.4	13.0	4.0	6.2	2.3	3.9	2.9	2.2	......	2.4	2.45
15	3.1	2.5	16.4	3.8	4.3	2.3	3.1	2.8	2.2	......	2.4	2.4
16	3.1	2.6	19.7	3.4	5.7	5.0	8.0	3.4	2.2	......	2.4	2.4
17	3.1	2.6	19.5	3.2	7.3	15.7	5.6	3.5	2.2	......	3.2	2.4
18	4.7	2.7	19.5	5.4	5.2	19.6	3.6	2.9	2.7	......	2.8	2.4
19	15.7	3.0	19.1	5.7	3.7	20.0	3.5	2.6	3.0	......	2.7	2.4
20	17.7	3.9	16.1	5.2	3.1	17.9	2.7	4.5	3.0	......	2.6	2.4
21	15.6	4.2	16.6	3.9	2.9	12.6	2.7	6.0	2.8	......	2.6	2.4
22	13.2	4.2	18.3	3.5	2.8	7.5	5.6	7.4	2.6	......	2.5	2.4
23	10.0	4.3	17.4	3.1	2.7	3.9	3.0	7.1	2.5	......	2.5	2.4
24	8.7	4.6	16.0	2.9	2.6	3.0	3.0	4.8	2.5	......	2.5	2.4
25	8.1	11.7	16.6	2.9	2.5	2.9	3.1	3.3	2.5	......	2.5	2.4
26	7.1	19.0	17.6	9.9	4.1	2.7	2.7	2.8	2.8	......	2.5	2.4
27	6.7	20.0	17.5	20.0	3.1	3.0	2.6	2.7	2.7	......	2.4	2.4
28	6.3	20.2	17.1	20.4	3.9	2.8	2.6	2.5	2.6	......	2.3	2.4
29	7.0	19.8	19.4	20.2	13.7	2.7	3.7	2.5	2.5	......	2.3	2.4
30	6.7	......	20.0	20.0	13.1	2.6	13.7	2.5	2.5	......	2.3	2.5
31	6.1	......	19.7	......	8.5	......	12.6	2.4	......	......	......	2.5

[a] Gage height 3.1 feet to top of ice.

[b] Gage height 2.7 feet to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 7–18 and Feb. 5–13. Gage heights Jan. 8–12, 14–17, and Feb. 7, 8, 9, and 12 to top of ice. Ice reported 6 to 6½ inches in thickness Jan. 13–17; 4½ inches Feb. 10, and 2 inches Feb. 11. The point of control is at the riffle in the gaging section, which is said to practically never freeze.

Daily discharge, in second-feet, of Skillet Fork River near Wayne City, Ill., for 1912.

Day.	Jan	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	420	205	5,300	4,900	3,080	182	13	586	7	7	55	3
2	293	97	2,960	2,220	547	76	118	205	7	......	167	7
3	197	90	499	4,700	190	76	76	90	7	......	62	7
4	132	69	313	4,700	111	48	118	41	3	......	34	7
5	118	......	257	4,010	83	41	242	27	3	......	20	7
6	97	......	160	1,060	48	34	1,520	27	20	......	41	13
7	......	......	182	257	41	27	2,310	20	13	......	398	13
8	......	......	235	190	41	27	1,280	20	7	......	265	7
9	......	......	710	146	48	27	1,770	20	3	......	97	7
10	......	......	796	118	41	27	950	41	3	......	34	7
11	......	......	796	104	69	27	1,110	34	3	......	27	7
12	......	......	950	76	832	7	547	62	3	......	27	7
13	......	......	1,200	69	614	3	227	76	3	......	20	7
14	......	7	1,460	118	283	3	111	41	1	......	7	10
15	......	13	2,910	104	139	3	55	34	1	......	7	7
16	......	20	5,500	76	242	190	475	76	1	......	7	7
17	......	20	5,300	62	398	2,550	235	83	1	......	62	7
18	......	27	5,300	220	205	5,400	90	41	27	......	34	7
19	2,550	48	4,900	242	97	5,800	83	20	48	......	27	7
20	3,710	111	2,750	205	55	3,860	27	153	48	......	20	7
21	2,500	132	3,020	111	41	1,340	27	265	34	......	20	7
22	1,520	132	4,180	83	34	420	235	409	20	......	13	7
23	760	139	3,500	55	27	111	48	376	13	......	13	7
24	559	160	2,700	41	20	48	48	174	13	......	13	7
25	487	1,110	3,020	41	13	41	55	69	13	......	13	7

Daily discharge, in second-feet, of Skillet Fork River near Wayne City, Ill., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	376	4,800	3,640	742	125	27	27	34	34	....	13	7
27	333	5,800	3,570	5,800	55	48	20	27	27	....	7	7
28	293	6,000	3,310	6,220	111	34	20	13	20	....	3	7
29	365	5,600	5,200	6,000	1,700	27	97	13	13	....	3	7
30	333	....	5,800	5,800	1,490	20	1,700	13	13	....	3	13
31	274	....	5,500	....	535	....	1,340	7	....	....	....	13

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 1 and 1,180 second-feet (gage heights 2.2 and 12 feet), and poorly defined above 1,180 second-feet (gage height 12 feet).

Discharge Jan. 7-18 and Feb. 5-13 estimated, because of ice, from climatologic records, gage heights, observer's notes, and discharge of adjacent drainage area, as follows: Jan. 7-18, 17 second-feet; Feb. 5-13, 7 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Skillet Fork River near Wayne City, Ill., for 1912.

[Drainage area, 481 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,710	....	501	1.04	1.20	D.
February	6,000	....	850	1.77	1.91	D.
March	5,800	160	2,770	5.76	6.64	B.
April	6,220	41	1,620	3.37	3.76	B.
May	3,080	13	365	.759	.88	B.
June	5,800	3	684	1.42	1.58	C.
July	2,310	13	483	1.00	1.15	B.
August	586	7	99.9	.208	.24	B.
September	48	1	13.6	.028	.03	D.
October	....	....	....	....	....	
November	398	3	50.4	.105	.12	C.
December	13	3	7.7	.016	.02	D.

NOTE.—See footnotes to table of daily discharge.

SKILLET FORK RIVER NEAR MILL SHOALS, ILL.

Location.—At Baltimore & Ohio Southwestern Railroad bridge about 1 mile south of Mill Shoals, Ill., and 1½ miles below the mouth of Griffin Creek.

Records available.—October 9, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—912 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent; old piles in bottom affect measurements at low stages. Point of control at section.

Discharge measurements.—Made from top of downstream plate girder of bridge and long wooden trestle approaches at each end.

Floods.—Maximum gage height since establishment of gage is 24.4, which occurred March 14, 1909. No available records of floods previous to establishment of gage.

Point of zero flow.—Estimated to be at 1.0 foot gage height, from an examination of the station at low water.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

Accuracy.—Backwater exists at this station and reliable estimates of flow can not be made, although 18 measurements of discharge were made during 1909-1912.

The following discharge measurement was made by P. S. Monk:
August 15, 1912: Gage height, 5.50 feet; discharge, 243 second-feet.

Daily gage height, in feet, of Skillet Fork River near Mill Shoals, Ill., for 1912.

[John A. Clow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.4	10.0	20.6	23.0	21.8	12.7	4.0	11.4	2.3	......	3.4	2.5
2	9.6	7.9	21.0	23.3	21.8	8.3	4.6	9.7	2.2	......	5.9	2.5
3	7.4	7.0	21.0	23.4	21.5	5.9	8.5	8.0	2.2	......	6.8	2.5
4	6.9	6.8	20.7	23.4	20.7	5.1	15.6	6.2	2.2	......	5.5	2.5
5	6.3	5.3	20.2	23.4	20.0	4.8	17.6	4.0	2.2	......	6.3	2.5
6	5.9	4.5	19.8	23.2	19.7	3.9	17.4	3.8	2.2	......	7.8	2.4
7	[a]5.1	4.1	18.7	23.0	15.4	3.6	17.1	3.3	2.2	......	......	2.4
8	5.1	3.9	18.0	22.6	13.7	3.1	17.0	2.7	2.1	......	9.4	2.4
9	5.1	3.7	17.4	22.2	10.0	3.0	16.5	3.0	2.0	......	......	2.4
10	[a]5.1	3.6	17.2	21.8	9.7	2.9	16.3	3.0	1.9	......	6.6	2.4
11	[a]4.0	3.4	17.1	21.0	8.9	2.7	16.2	3.8	1.9	......	6.0	2.4
12	[a]3.8	3.3	17.2	19.7	7.9	2.7	15.8	4.4	1.9	......	5.5	2.4
13	[a]3.2	[a]3.1	17.6	19.5	9.3	2.7	16.9	4.9	1.8	......	4.6	2.4
14	[a]3.2	3.0	18.1	19.0	10.8	2.6	16.7	......	1.8	......	4.1	2.4
15	[a]3.1	2.9	18.9	16.9	8.5	2.5	15.3	5.1	1.8	......	3.6	2.4
16	[a]3.1	3.0	19.8	13.6	7.9	2.4	14.9	4.9	1.8	......	3.4	2.4
17	3.0	3.1	20.3	11.8	8.9	14.5	7.9	4.1	1.8	......	3.1	2.3
18	3.0	3.3	20.8	9.3	7.8	16.7	6.5	4.0	1.8	......	3.1	2.3
19	[a]5.9	4.0	21.0	8.9	6.4	17.8	4.9	3.8	1.8	......	3.1	2.4
20	11.4	4.1	21.1	7.4	6.0	18.7	4.0	4.6	2.0	......	3.1	2.4
21	[a]13.8	6.9	21.4	6.7	4.8	19.3	3.9	11.0	3.5	......	3.1	2.4
22	[a]15.6	7.0	21.4	9.0	4.0	19.6	([b])	11.4	3.4	......	3.1	2.4
23	16.0	6.8	21.4	6.4	3.9	19.7	......	10.7	3.0	......	3.0	2.4
24	15.9	6.1	21.6	5.9	3.9	19.1	......	9.9	2.5	......	2.9	2.4
25	[a]15.4	7.8	21.8	4.9	3.8	18.5	......	7.7	3.5	......	2.8	2.4
26	14.4	13.7	21.9	16.9	3.6	13.7	([b])	5.1	......	......	2.7	2.4
27	14.3	18.6	21.9	19.3	3.2	9.0	3.4	4.0	7.6	......	2.6	2.4
28	14.2	19.1	22.0	20.0	5.0	7.8	3.7	3.9	5.9	......	2.5	2.3
29	13.9	19.8	22.4	20.7	8.7	6.5	3.9	3.0	3.2	......	2.5	2.2
30	13.5	......	22.5	21.5	13.3	5.1	4.5	2.9	2.9	......	2.5	2.0
31	12.1	......	22.8	......	......	......	10.6	2.4	......	......	......	2.0

[a] Gage height to top of ice.

[b] Gage out of order.

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 7-19, and Feb. 7-20. Observer reported "ice 10 inches thick, Jan. 19," "water along sides, ice thawing Jan. 20."

TENNESSEE RIVER BASIN.

FRENCH BROAD RIVER AT ASHEVILLE, N. C.

Location.—At highway bridge known as Smith's Bridge, about 1 mile below the Southern Railway station at Asheville, about 2 miles below the mouth of Swannanoa River. Smith's Bridge is one-fourth mile above the new Southern Railway bridge and about one-fourth mile below a concrete highway bridge recently completed.

Records available.—March 19, 1903, to December 31, 1912. The United States Weather Bureau has maintained a gage at this point since March 19, 1903, and during 1904 a number of discharge measurements were made by the United States Geological Survey. Since January 1, 1905, the discharge measurements have been continued by the United States Geological Survey and the gage heights have been furnished by the United States Weather Bureau.

Drainage area.—987 square miles.

Gages.—Vertical staff attached to one of the bridge piers, and an auxiliary chain gage attached to the bridge in the first panel to the left of the staff gage. The staff gage ends at zero and the chain gage is used for readings below zero. Both gages are adjusted to the same datum, which has remained unchanged since they were established.

Channel.—Practically permanent; broken by three piers of the highway bridge. Bed of river is mostly rock, but is not excessively rough. Current good at all points.

Discharge measurements.—Made from the downstream side of the highway bridge.

Floods.—The flood of August 31, 1910, reached a height of about 8.8 feet by the gage datum. Stage of 10.6—"date unknown"—reported by the United States Weather Bureau.

Winter flow.—Ice does not affect the flow.

Accuracy.—The construction of a new railroad bridge across the river about 1,500 feet below the gage in 1907-8 caused changes in channel necessitating revision in the discharge rating curve. The cofferdams caused temporary and variable changes during 1908, but since the completion of the work comparatively permanent conditions of flow have been reestablished.

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Discharge measurements of French Broad River at Asheville, N. C., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 27	W. E. Hall	1.28	3,120	Mar. 29	W. E. Hall	4.32	10,200
28	do	4.04	9,700	30	do	3.87	8,930
29	do	4.30	10,200	Sept. 16	do	.30	1,690

Daily gage height, in feet, of French Broad River at Asheville, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	0.7	1.2	2.1	1.0	0.4	0.5	0.6	−0.2	0.0	−0.4	−0.3
2	1.1	.4	1.0	2.4	.9	.4	.5	.4	− .3	.0	.1	− .3
3	.8	.2	.8	2.0	.8	.7	.8	.1	− .3	− .1	− .1	.1
4	.5	.2	.8	1.7	.7	.8	.7	1.5	− .3	− .2	− .3	− .1
5	.5	.1	.9	1.5	1.4	.7	.8	.7	− .4	− .3	− .4	.2
6	.4	.1	.9	1.3	1.4	.4	1.4	.4	− .4	− .2	− .3	.4
7	.4	.2	1.0	1.3	2.1	.8	1.2	.1	− .4	− .2	.2	.7
8	.3	.2	1.0	1.2	2.0	.8	.9	.1	− .4	− .3	1.4	.4
9	.3	.1	1.0	1.1	1.6	.6	.7	.1	− .4	− .3	.5	.2
10	.5	.1	.9	1.0	1.2	.4	.9	.2	− .4	− .3	.2	− .1
11	.3	.0	.8	.9	1.1	.3	.8	.1	− .4	− .3	.0	− .2
12	.1	− .1	.7	.9	1.8	.2	1.1	.0	− .4	− .4	− .1	− .2
13	.1	− .1	.8	.8	1.3	.3	1.0	− .1	− .4	− .3	− .2	− .2
14	.1	− .1	.7	.8	1.0	.3	.8	.2	− .3	.2	− .2	− .3
15	.1	− .1	2.8	.7	.9	1.5	.9	.0	− .2	.0	− .3	− .3
16	.0	.8	4.2	.8	1.1	.8	.8	.1	.4	− .2	− .3	− .3
17	.0	.8	3.4	1.0	1.2	.5	.9	.3	.0	− .3	− .3	− .3
18	.1	.8	2.4	1.0	.8	.3	1.0	.2	− .1	− .3	− .3	− .3
19	.2	1.0	1.7	.9	.7	.2	1.2	.1	− .2	− .3	− .4	− .3
20	.5	.8	1.4	.8	.6	.2	1.4	.1	− .3	− .3	− .4	− .3
21	.3	.9	2.2	.7	.5	.1	1.7	.0	− .3	− .3	− .3	− .3
22	.1	3.0	1.0	.7	.5	.1	1.1	.1	− .4	− .2	− .3	− .3
23	.1	2.5	1.0	2.3	.4	.1	1.0	.1	1.4	− .2	− .4	− .3
24	.1	1.4	2.0	1.5	.4	.3	.8	− .2	2.5	− .2	− .4	− .3
25	.0	1.5	2.3	1.1	.3	.8	.7	− .2	1.8	− .2	− .4	− .3
26	.0	1.6	1.6	.9	.3	1.9	.6	.1	.5	− .3	− .4	− .2
27	.0	2.7	1.4	.9	.3	1.6	.4	.0	1.0	− .3	− .4	− .2
28	.0	2.1	1.1	1.5	.5	.8	.4	− .1	.5	− .3	− .4	− .2
29	.1	1.5	4.0	1.2	.7	.6	.3	− .2	.3	− .4	− .4	− .3
30	2.0		3.9	1.3	1.2	.6	.2	− .2	.1	− .4	− .4	− .3
31	1.3		3.0		.7		.1	− .2		− .4		.6

Daily discharge, in second-feet, of French Broad River at Asheville, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,410	2,190	2,910	4,550	2,600	1,820	1,940	2,060	1,190	1,390	1,010	1,100
2	2,750	1,820	2,600	5,200	2,460	1,820	1,940	1,820	1,100	1,390	1,490	1,100
3	2,320	1,600	2,320	4,350	2,320	2,190	2,320	1,490	1,100	1,290	1,290	1,490
4	1,940	1,600	2,320	3,770	2,190	2,320	2,190	3,410	1,100	1,190	1,100	1,290
5	1,940	1,490	2,460	3,410	3,240	2,190	2,320	2,190	1,010	1,100	1,010	1,600
6	1,820	1,490	2,460	3,070	3,240	1,820	3,240	1,820	1,010	1,190	1,100	1,820
7	1,820	1,600	2,600	3,070	4,550	2,320	2,910	1,490	1,010	1,190	1,600	2,190
8	1,710	1,600	2,600	2,910	4,350	2,320	2,460	1,490	1,010	1,100	3,240	1,820
9	1,710	1,490	2,600	2,750	3,590	2,060	2,190	1,490	1,010	1,100	1,940	1,600
10	1,940	1,490	2,460	2,600	2,910	1,820	2,460	1,600	1,010	1,100	1,600	1,290
11	1,710	1,390	2,320	2,460	2,750	1,710	2,320	1,490	1,010	1,100	1,390	1,190
12	1,490	1,290	2,190	2,460	3,960	1,600	2,750	1,390	1,010	1,010	1,290	1,190
13	1,490	1,290	2,320	2,320	3,070	1,710	2,600	1,290	1,010	1,100	1,190	1,190
14	1,490	1,290	2,190	2,320	2,600	1,710	2,320	1,600	1,100	1,600	1,190	1,100
15	1,490	1,290	6,140	2,190	2,460	3,410	2,460	1,390	1,190	1,390	1,100	1,100
16	1,390	2,320	9,940	2,320	2,750	2,320	2,320	1,490	1,820	1,190	1,100	1,100
17	1,390	2,320	7,690	2,600	2,910	1,940	2,460	1,710	1,390	1,100	1,100	1,100
18	1,490	2,320	5,200	2,600	2,320	1,710	2,600	1,600	1,290	1,100	1,100	1,100
19	1,600	2,600	3,770	2,460	2,190	1,600	2,910	1,490	1,190	1,100	1,010	1,100
20	1,940	2,320	3,240	2,320	2,060	1,600	3,240	1,490	1,100	1,100	1,010	1,100
21	1,710	2,460	4,760	2,190	1,940	1,490	3,770	1,390	1,100	1,100	1,100	1,100
22	1,490	6,640	2,600	2,190	1,940	1,490	2,750	1,490	1,010	1,190	1,100	1,100
23	1,490	5,430	2,600	4,980	1,820	1,490	2,600	1,490	3,240	1,190	1,010	1,100
24	1,490	3,240	4,350	3,410	1,820	1,710	2,320	1,190	5,430	1,190	1,010	1,100
25	1,390	3,410	4,980	2,750	1,710	2,320	2,190	1,190	3,960	1,190	1,010	1,100
26	1,390	3,590	3,590	2,460	1,710	4,150	2,060	1,490	1,940	1,100	1,010	1,190
27	1,390	5,900	3,240	2,460	1,710	3,590	1,820	1,390	2,600	1,100	1,010	1,190
28	1,390	4,550	2,750	3,410	1,940	2,320	1,820	1,290	1,940	1,100	1,010	1,190
29	1,490	3,410	9,360	2,910	2,190	2,060	1,710	1,190	1,710	1,010	1,010	1,100
30	4,350	....	9,070	3,070	2,910	2,060	1,600	1,190	1,490	1,010	1,010	1.100
31	3,070	....	6,640	....	2,190	....	1,490	1,190	....	1,010	....	2.060

NOTE.—Daily discharge determined by means of a discharge rating curve well defined between 920 and 10,800 second-feet (gage heights —0.5 and 4.5 feet).

Monthly discharge of French Broad River at Asheville, N. C., for 1912.

[Drainage area, 987 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	4,350	1,390	1,850	1.87	2.16	A.
February	6,640	1,290	2,530	2.56	2.76	A.
March	9,940	2,190	4,010	4.06	4.68	A.
April	5,200	2,190	2,990	3.03	3.38	A.
May	4,550	1,710	2,590	2.62	3.02	A.
June	4,150	1,490	2,090	2.12	2.36	A.
July	3,770	1,490	2,390	2.42	2.79	A.
August	3,410	1,190	1,560	1.58	1.82	A.
September	5,430	1,010	1,570	1.59	1.77	A.
October	1,600	1,010	1,160	1.18	1.36	B.
November	3,240	1,010	1,240	1.26	1.41	B.
December	2,190	1,100	1,290	1.31	1.51	B.
The year	9,940	1,010	2,100	2.13	29.02	

TENNESSEE RIVER AT KNOXVILLE, TENN.

Location.—At county highway bridge at Gay Street, in the city of Knoxville, about 4 miles below the junction of French Broad and Holstôn rivers.

Records available.—January 17, 1899, to December 31, 1912. The United States Weather Bureau began river observations February 1, 1883, but the earlier gage-height records are not continuous. For a number of years prior to 1899 daily gage readings were made for about one-half of the year, including the winter season.

Drainage area.—8,990 square miles.

Gage.—Vertical gage on one of the county bridge piers; used since January 1, 1909. The original gage on a pier of the old bridge at the same site was used prior to 1899. During construction of the new bridge, January 17, 1899, the gage was removed to the Knoxville & Augusta Railroad bridge one-half mile downstream. Later during the same year a more permanent gage was installed, 1,000 feet still farther downstream at a point on the right bank just below the mouth of West Knoxville Bayou. This gage was set to read the same as the original gage, having its zero point 2.3 feet lower than that of the original gage on account of fall in the river. All gage heights for 1899 were adjusted to conform to this gage, and it was used continuously until December 31, 1908. The present gage at the county bridge reads the same at low stages as the one it supersedes, but the two gages do not read the same at higher stages. A relation based on comparative readings has been computed by the United States Weather Bureau, and has been applied to the discharge rating curve to adapt it to the present gage.

Channel.—Wide and relatively shallow, with rough, rocky bottom. Permanency of flow will depend upon the permanency of some river improvement wing dams below.

Discharge measurements.—Made from the downstream side of the bridge, floor of which is about 100 feet above water.

Floods.—The flood of March, 1875, reached a height of about 39.0 feet by the gage datum (United States Weather Bureau publication).

Point of zero flow.—Assuming that the improved boat channels below the station are 3.0 feet deep at low water, according to the plan for that portion of the river, there would be no flow past the gage if the river stage were to fall to about −4.5 feet by the gage datum.

Winter flow.—Ice does not affect the flow.

Accuracy.—The discharge rating curve for the present gage is based chiefly on the curve for the former gage adjusted according to the relative readings of the two gages. Discharge measurements made during 1909 and 1911 (no discharge measurements made during 1912), referred to the present gage, agree well with the derived curve, but all parts of the curve have not yet been verified by discharge measurements. Estimates of discharge are withheld from publication for the present. (See Water-Supply Paper 283.)

Cooperation.—Gage heights are furnished by the United States Weather Bureau.

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	6.0	4.1	8.9	10.5	2.6	2.3	2.4	0.6	1.0	0.0	−0.4
2	3.4	3.8	3.3	12.7	7.8	2.2	2.3	2.5	.5	.8	.0	− .5
3	3.0	3.0	2.9	17.0	5.4	1.7	2.5	1.8	.5	.7	.0	− .5
4	2.8	2.5	2.8	15.9	4.4	1.7	2.4	1.7	.4	.6	− .1	1.0
5	2.5	2.9	2.8	10.5	4.0	2.0	3.8	1.3	.4	.6	− .1	1.5
6	2.4	2.0	2.9	6.5	5.0	2.0	3.0	1.8	.3	.6	− .1	2.5
7	2.0	1.9	3.7	5.1	4.6	1.9	3.4	1.4	.3	.5	.0	2.4
8	1.8	1.8	3.7	4.5	4.9	2.0	2.9	1.3	.3	.4	1.0	2.0
9	1.8	1.8	4.5	4.2	4.7	2.0	2.4	1.0	.2	.0	1.9	1.4
10	2.0	1.7	5.9	3.7	4.0	1.8	2.1	1.1	.2	.0	2.1	1.2
11	2.0	1.8	7.0	3.4	3.5	1.5	2.4	1.2	.2	.0	1.6	1.0
12	1.8	1.6	5.1	3.0	3.0	1.4	2.9	1.0	.1	.0	1.1	.9
13	1.8	1.5	4.5	2.8	2.9	.9	2.8	1.0	.0	.0	.9	.9
14	1.5	1.4	4.5	2.9	2.9	.8	2.4	1.0	.0	4	.7	.5
15	1.7	1.4	6.5	2.5	2.7	.9	2.2	.9	.0	.5	.7	.8

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	1.0	2.0	11.5	2.8	2.5	2.0	2.0	1.5	−0.1	1.0	0.6	0.5
17	1.1	2.4	12.8	3.2	2.8	2.4	1.9	1.4	.5	1.0	.6	− .5
18	.8	2.4	10.0	3.7	4.4	2.0	1.5	1.0	.8	.7	.6	− .4
19	1.5	2.3	6.5	3.6	3.5	2.0	1.5	1.1	.6	.5	.5	.5
20	1.8	2.3	4.8	3.1	2.9	1.5	2.0	1.4	.5	.4	.4	.0
21	2.0	2.5	4.0	2.9	2.5	1.4	2.8	1.4	.6	.4	.2	.0
22	2.4	4.8	3.5	2.9	2.4	1.0	2.5	1.8	.5	.4	.0	.2
23	2.0	7.5	3.0	6.1	2.2	1.0	2.4	2.4	1.5	.4	.0	− .3
24	1.8	6.5	3.4	6.6	2.0	1.0	2.5	1.8	.9	.4	− .1	.0
25	1.7	4.1	4.0	4.8	1.9	1.0	2.4	1.4	2.5	.4	− .2	.5
26	1.6	3.8	4.5	3.5	1.8	2.5	3.3	1.4	2.4	.2	− .2	.3
27	1.5	4.9	4.5	3.8	1.6	2.4	2.9	1.0	2.0	.2	− .2	.4
28	1.3	6.0	4.0	8.0	2.0	2.4	2.4	1.0	2.0	.1	− .3	.6
29	1.6	5.8	8.9	7.5	2.8	2.4	1.8	1.0	1.5	.1	− .3	.4
30	3.2	....	13.8	11.5	3.1	2.4	1.5	.8	1.4	.0	− .3	1.4
31	5.6	....	12.9	....	3.0	....	1.2	.6	....	.0	....	2.0

TENNESSEE RIVER AT CHATTANOOGA, TENN.

Location.—At Hamilton County highway bridge in the city of Chattanooga, just below Chattanooga Island, 4 miles below South Chickamauga Creek and 3 miles above Chattanooga Creek.

Records available.—January 1, 1879, to December 31, 1912. The United States Weather Bureau began observations of gage heights January 1, 1879. Earlier records beginning in 1875, when the first gage was established, are fragmentary. Discharge measurements were first made by the United States Geological Survey in 1897. Gage heights from January 1, 1900, have been published by the United States Geological Survey. A number of discharge measurements made by the United States Weather Bureau in 1893 have also been published by the United States Geological Survey.

Drainage area.—21,400 square miles (published by the United States Weather Bureau).

Gage.—The present standard gage consists of a sloping iron section (railroad T rail) bolted to rock and a vertical timber attached to the rock cliff on the left bank at the foot of Lookout Street, about 200 feet upstream from the bridge. It was erected October 31, 1884. The original gage was established in 1875. An automatic recording gage, which makes its record in the Weather Bureau office, has been used for several years. There is also a vertical section of brass gage attached to the pier nearest the left bank, and recently half-foot graduations have been painted on the pipe incasing the recording gage float, to be read from the bridge with the aid of a glass. The datum has remained the same for all of the gages.

Channel.—Permanent or nearly so, though a portion of the bed is sand. Current good.

Discharge measurements.—Made from downstream footway of bridge; elevation about 100 feet above water.

Floods.—The flood of March 11, 1867, reached a height of about 58.0 feet by the gage datum (information from United States Weather Bureau).

Point of zero flow.—Reports of the United States engineers show that the bottom of the excavated boat channel at Ross Towhead, 2½ miles below the gage, is about 5 feet lower than gage datum, which indicates that there would be no flow past the gage if the stage were to fall to about −5.0 feet.

Winter flow.—Ice does not appreciably affect the flow.

Artificial control.—None probably at present. A large dam for lock and power plant about 20 miles below will, when completed, raise the water level at Chattanooga, and will entirely destroy the usefulness of the gage heights for estimates of flow.

Accuracy.—Daily gage heights in the following table are as furnished by the United States Weather Bureau and were obtained from the automatic recording gage record with corrections based on periodic readings of the gage painted on the float pipe. The reading of the automatic recording gage has been checked at various times by engineers of the Survey and found to be essentially correct, but on November 25, 1911, a discrepancy of 0.5 foot was noted, the automatic recording gage reading too high by that amount. The discharge measurements made by Survey engineers are referred to the cliff or float pipe gages, to which, therefore, the discharge rating curve refers. The accuracy of daily and monthly discharge obtained by applying this rating curve to the automatic recording gage record is questionable and those discharge values should be used with caution.

Cooperation.—The daily gage heights have all been furnished by the United States Weather Bureau.

The following discharge measurement was made by means of floats by W. E. Hall: March 31, 1912: Gage height, 31.3 feet; discharge, 185,000 second-feet. (Coefficient for reducing surface to mean velocity, 0.90.)

Daily gage height, in feet, of Tennessee River at Chattanooga, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.9	14.3	14.4	29.6	25.4	8.6	6.3	4.8	3.3	3.8	1.9	1.6
2	13.5	14.2	12.3	26.1	26.0	7.4	5.8	4.8	3.1	3.4	1.8	1.6
3	12.1	12.6	10.3	26.3	22.3	6.6	5.7	4.8	2.9	3.1	1.8	1.6
4	10.7	10.4	9.1	29.3	16.7	6.0	5.6	5.2	2.8	2.8	1.8	1.7
5	9.4	7.8	8.5	30.2	12.9	5.7	5.9	4.5	2.7	2.6	1.8	3.2
6	8.2	7.3	8.4	29.2	11.5	5.6	6.2	4.3	2.6	2.5	1.8	7.0
7	7.2	6.7	8.4	22.7	10.9	5.6	7.8	4.2	2.6	2.4	1.8	9.6
8	6.4	5.7	9.2	14.9	11.7	5.8	7.8	4.2	2.5	2.3	1.8	10.2
9	6.3	5.5	10.2	12.4	12.0	5.4	7.6	4.2	2.5	2.2	2.0	8.5
10	6.4	5.2	10.9	11.1	11.0	5.3	7.0	4.1	2.4	2.1	2.7	7.0
11	6.9	5.2	12.1	10.3	10.1	5.1	6.7	4.1	2.4	2.0	3.2	5.9
12	6.7	4.9	12.5	9.5	9.5	4.8	7.9	4.1	2.4	1.9	3.4	5.0
13	6.6	4.9	12.7	8.9	8.8	4.5	8.0	4.0	2.3	1.9	3.3	4.5
14	6.3	4.9	12.0	8.4	8.3	3.9	7.7	3.8	2.2	1.9	3.0	4.0
15	5.8	4.8	13.8	7.9	7.8	3.9	6.8	3.6	2.2	1.9	2.7	3.7
16	5.8	5.5	20.0	7.8	7.5	4.3	6.3	3.6	2.1	1.9	2.5	3.5
17	4.8	6.3	23.9	8.4	7.4	4.4	6.0	3.8	2.0	2.2	2.5	3.3
18	4.6	6.4	23.8	9.4	7.3	4.6	5.7	4.1	2.0	2.4	2.3	3.3
19	4.2	6.2	21.7	9.9	7.3	4.8	5.2	4.0	2.2	2.4	2.1	3.3
20	4.4	6.1	17.5	10.0	7.7	4.6	5.2	3.9	2.4	2.4	2.1	3.5
21	4.9	6.4	13.2	9.0	7.7	4.4	5.4	3.9	2.7	2.7	2.1	3.5
22	5.6	10.9	11.1	8.5	7.0	4.0	5.5	4.0	2.7	2.8	2.0	3.4
23	5.6	14.9	9.4	11.7	6.4	3.8	6.0	4.3	3.8	2.7	2.0	3.2
24	5.9	15.6	9.1	15.5	6.0	3.6	6.0	4.4	4.5	2.4	1.9	3.2
25	5.9	15.1	12.8	14.6	5.7	3.8	5.6	5.2	6.1	2.3	1.9	3.4
26	5.4	13.8	15.5	12.1	5.5	4.9	5.5	4.9	5.0	2.2	1.8	3.9
27	5.1	14.5	13.7	10.5	5.4	5.5	5.4	4.5	4.9	2.1	1.8	4.1
28	4.9	17.6	12.8	14.8	5.2	6.2	5.8	4.1	4.9	2.1	1.8	4.1
29	5.1	16.5	20.2	20.3	5.6	6.5	6.0	3.8	4.8	2.0	1.7	4.0
30	8.8	....	28.5	22.7	7.8	6.8	5.6	3.6	4.4	2.0	1.6	4.0
31	13.5	....	31.3	....	9.8	....	5.0	3.4	....	1.9	....	5.2

Daily discharge, in second-feet, of Tennessee River at Chattanooga, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	76,100	84,800	85,400	180,000	154,000	49,400	35,200	26,000	17,600	20,300	10,800	9,490
2	79,800	84,100	72,400	158,000	157,000	42,000	32,100	26,000	16,500	18,100	10,300	9.490
3	71,100	74,200	60,000	159,000	134,000	37,000	31,400	26,000	15,500	16,500	10,300	9,490
4	62,400	60,600	52,500	178,000	99,600	33,300	30,800	28,400	15,000	15,000	10,300	9,900
5	54,400	44,500	48,800	183,000	76,100	31,400	32,700	24,300	14,500	14,000	10,300	17,000
6	46.900	41,400	48,200	177,000	67,400	30,800	34,500	23,100	14,000	13,600	10,300	39,500
7	40.700	37,600	48,200	137,000	63,700	30,800	44,500	22,500	14,000	13,100	10,300	55,600
8	35,800	31,400	53,100	88,500	68,600	32,100	44,500	22,500	13,600	12,600	10,300	59,300
9	35,200	30,200	59,300	73,000	70,500	29,600	43,200	22,500	13,600	12,100	11.200	48.800
10	35,800	28,400	63,700	64,900	64,300	29,000	39,500	22,000	13,100	11,700	14,500	39,500
11	38,900	28,400	71,100	60,000	58,700	27,800	37,600	22,000	13,100	11,200	17,000	32,700
12	37,600	26,600	73,600	55,000	55,000	26,000	45,100	22,000	13,100	10,800	18,100	27,200
13	37,000	26,600	74,800	51,300	50,700	24,300	45,700	21,400	12,600	10,800	17,600	24,300
14	35,200	26,600	70,500	48,200	47,600	20,800	43.800	20,300	12,100	10,800	16,000	21,400
15	32,100	26,000	81,700	45,100	44,500	20,800	38,300	19,200	12,100	10,800	14,500	19,700
16	32,100	30,200	120,000	44,500	42,600	23,100	35,200	19,200	11,700	10,800	13,600	18,600
17	26,000	35,200	144,000	48,200	42,000	23,700	33,300	20,300	11,200	12,100	13.600	17,600
18	24,800	35,800	144,000	54.400	41,400	24,800	31,400	22,000	11,200	13,100	12,600	17,600
19	22,500	34,500	131,000	57,500	41,400	26,000	28,400	21,400	12,100	13,100	11,700	17.600
20	23,700	33,900	106,000	58,100	43,800	24,800	28,400	20,800	13,100	13,100	11,700	18,600
21	26,600	35,800	77,900	51,900	43,800	23,700	29,600	20,800	14,500	14,500	11,700	18,600
22	30.800	63,700	64,900	48,800	39,500	21,400	30,200	21,400	14,500	15,000	11.200	18.100
23	30,800	88,500	54,400	68,600	35,800	20,300	33,300	23,100	20,300	14,500	11,200	17.000
24	32,700	92,800	52,500	92,200	33,300	19,200	33,300	23,700	24,300	13,100	10,800	17,000
25	32,700	89,700	75,500	86,600	31,400	20,300	30,800	28,400	33,900	12,600	10,800	18,100
26	29,600	81,700	92,200	71,100	30,200	26,600	30,200	26,600	27,200	12,100	10,300	20.800
27	27,800	86,000	81,000	61,200	29,600	30,200	29,600	24,300	26,600	11,700	10,300	22,000
28	26,600	105,000	75.500	87,900	28,400	34,500	32,100	22,000	26,600	11,700	10,300	22.000
29	27,800	98,400	121,000	122,000	30,800	36,400	33,300	20,300	26,000	11,200	9,900	21,400
30	50,700	....	173,000	137,000	44,500	38,300	30,800	19,200	23,700	11,200	9,490	21,400
31	79,800	....	190,000	....	56,900	....	27,200	18,100	....	10,800	....	28,400

NOTE.—Daily discharge computed from a fairly well defined rating curve. Below 33,300 second-feet (gage height 6.0 feet) this curve is the same as that used for 1910–11, the change above 33,300 second-feet being based on the results of discharge measurement made Mar. 31, 1912.

Monthly discharge of Tennessee River at Chattanooga, Tenn., for 1912.

[Drainage area, 21,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.[a]
	Maximum.	Minimum.	Mean.	Per square mile.		
January	79,800	22,500	40,100	1.87	2.16	B.
February	105,000	26,000	53,900	2.52	2.72	B.
March	190,000	48,200	86,000	4.02	4.64	B.
April	183,000	44,500	91,600	4.28	4.78	B.
May	157,000	28,400	58,900	2.75	3.17	B.
June	49,400	19,200	28,600	1.34	1.50	B.
July	45,700	27,200	34,700	1.62	1.87	B.
August	28,400	18,100	22,600	1.06	1.22	B.
September	33,900	11,200	16,900	.790	.88	B.
October	20,300	10,800	13,000	.607	.70	B.
November	18,100	9,490	12,000	.561	.63	B.
December	59,300	9,490	23,800	1.11	1.28	B.
The year	190,000	9,490	40,100	1.87	25.55	

[a] See "Accuracy" in station description.

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

Location.—At highway bridge at Bluff City, Tenn., 300 feet below Virginia & Southwestern Railway bridge, 1 mile below the mouth of Indian Creek, and about 10 miles above the mouth of Watauga River.

Records available.—July 17, 1900, to December 31, 1912.

Drainage area.—828 square miles.

Gage.—Vertical staff attached to downstream side of bridge pier nearest the right bank; datum unchanged since established.

Channel.—Very irregular in depth and velocity of current; surface height controlled by shallow ledge below; probably permanent.

Discharge measurements.—Made from downstream side of the bridge. Also made from the railroad bridge 300 feet above, where the section is much better except at low stages, when the current there becomes sluggish.

Winter flow.—Ice does not affect the flow. A few days the observer has reported "Frozen," but this has probably referred to the water at the foot of gage rather than in the channel.

Cooperation.—Since January 1, 1905, the gage heights have been furnished by the United States Weather Bureau.

The following discharge measurement was made by W. E. Hall:

June 19, 1912: Gage height, 1.23 feet; discharge, 876 second-feet.

Daily gage height, in feet, of South Fork of Holston River at Bluff City, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.9	3.1	2.5	3.6	3.4	1.6	1.3	1.3	1.0	0.6	0.4	0.3
2	1.9	2.5	2.3	6.4	2.9	1.4	1.5	1.6	.8	.5	.5	.4
3	1.9	2.2	2.1	3.1	2.6	1.4	2.3	1.2	.7	.5	.4	.4
4	1.8	2.0	2.1	5.0	2.6	1.4	1.9	1.2	.6	.5	.3	.6
5	1.6	1.6	2.2	4.0	2.4	1.3	2.5	1.4	.8	.4	.3	1.5
6	1.7	1.7	2.8	3.4	2.2	1.3	2.8	1.2	.8	.4	.3	1.5
7	......	1.8	2.7	3.0	2.7	1.4	2.3	1.0	.6	.4	.5	1.4
8	......	1.8	2.9	3.2	3.7	1.4	1.8	.8	.5	.4	1.6	1.2
9	1.9	1.6	4.2	2.8	3.5	1.3	1.6	.8	1.1	.4	1.3	1.0
10	1.8	1.5	5.0	2.6	2.9	1.2	1.5	.9	.7	.3	1.0	.9
11	1.4	1.4	3.8	2.5	2.5	1.0	2.0	1.1	.5	.3	.8	.8
12	1.3	1.4	3.2	2.4	2.4	1.0	2.0	.9	.5	.3	.7	.7
13	1.2	1.3	3.3	2.2	2.2	.9	1.8	.9	.4	.3	.6	.5
14	1.0	1.2	4.0	2.1	2.0	.9	1.5	.9	.4	.4	.7	.3
15	.9	1.2	3.9	2.0	1.9	1.0	1.2	.8	.4	.7	.7	.3
16	.8	1.6	7.2	4.2	4.1	1.3	1.0	.8	.4	.7	.6	.4
17	.8	1.6	4.8	2.8	4.0	1.0	.9	.7	.3	.5	.6	.6
18	1.1	1.6	3.8	2.8	3.1	1.0	.8	.8	.3	.4	.6	.6
19	1.2	1.6	3.2	2.7	2.6	1.2	1.1	1.0	1.3	.6	.6	.6
20	2.7	1.6	2.8	2.4	2.2	1.1	1.2	1.2	1.1	.6	.5	.5
21	2.5	2.0	2.6	2.3	2.0	1.0	1.2	2.9	.8	.5	.5	.5
22	2.2	4.9	2.5	2.2	1.9	.8	1.1	2.0	.5	.4	.5	.4
23	1.7	3.7	2.3	3.0	1.8	.8	1.3	1.8	.7	.5	.5	.4
24	1.5	2.8	2.3	2.7	1.7	.8	1.1	1.5	1.7	.6	.4	.6
25	1.4	2.9	4.0	2.4	1.6	1.1	1.3	1.2	1.3	.5	.4	.6
26	1.4	2.8	3.7	2.2	1.5	1.1	1.8	1.1	1.0	.4	.4	.5
27	1.8	4.4	3.3	2.1	1.4	1.1	1.4	1.4	.9	.4	.5	.3
28	1.7	3.9	2.9	4.0	1.4	1.1	1.0	1.1	.8	.4	.4	.5
29	1.9	3.1	6.1	3.2	1.9	1.6	1.0	1.0	.7	.4	.4	.6
30	4.7	......	6.3	3.9	2.2	1.2	.9	.9	.6	.4	.3	.9
31	4.2	......	4.3	......	1.9	......	1.2	.9	......	.4	......	2.4

Daily discharge, in second-feet, of South Fork of Holston River at Bluff City, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,380	2,760	2,010	3,460	3,180	1,100	860	860	650	420	325	285
2	1,380	2,010	1,790	8,720	2,500	940	1,020	1,100	530	370	370	325
3	1,380	1,680	1,580	12,700	2,130	940	1,790	785	475	370	325	325
4	1,280	1,480	1,580	5,800	2,130	940	1,380	785	420	370	285	420
5	1,100	1,100	1,680	4,060	1,900	860	2,010	940	530	325	285	1,020
6	1,190	1,190	2,370	3,180	1,680	860	2,370	785	530	325	285	1,020
7	1,250	1,280	2,250	2,630	2,250	940	1,790	650	420	325	370	940
8	1,310	1,280	2,500	2,900	3,610	940	1,280	530	370	325	1,100	785
9	1,380	1,100	4,390	2,370	3,320	860	1,100	530	715	325	860	650
10	1,280	1,020	5,800	2,130	2,500	785	1,020	590	475	285	650	590
11	940	940	3,760	2,010	2,010	650	1,480	715	370	285	530	530
12	860	940	2,900	1,900	1,900	650	1,480	590	370	285	475	475
13	785	860	3,040	1,680	1,680	590	1,280	590	325	285	420	370
14	650	785	4,060	1,580	1,480	590	1,020	590	325	325	475	285
15	590	785	3,910	1,480	1,380	650	785	530	325	475	475	285
16	530	1,100	10,600	4,390	4,220	860	650	530	325	475	420	325
17	530	1,100	5,440	2,370	4,060	650	590	475	285	370	420	420
18	715	1,100	3,760	2,370	2,760	650	530	530	285	325	420	420
19	785	1,100	2,900	2,250	2,130	785	715	650	860	420	420	420
20	2,250	1,100	2,370	1,900	1,680	715	785	785	715	420	370	370
21	2,010	1,480	2,130	1,790	1,480	650	785	2,500	590	370	370	370
22	1,680	5,620	2,010	1,680	1,380	530	715	1,480	370	325	370	325
23	1,190	3,610	1,790	2,630	1,280	530	860	1,280	475	370	370	325
24	1,020	2,370	1,790	2,250	1,190	530	715	1,020	1,190	420	325	420
25	940	2,500	4,060	1,900	1,100	715	860	785	860	370	325	420
26	940	2,370	3,610	1,680	1,020	715	1,280	715	650	325	325	370
27	1,280	4,730	3,040	1,580	940	715	940	940	590	325	370	285
28	1,190	3,910	2,500	4,060	940	715	650	715	530	325	325	370
29	1,380	2,760	8,050	2,900	1,380	1,100	650	650	475	325	325	420
30	5,260	....	8,490	3,910	1,680	785	590	590	420	325	285	590
31	4,390	....	4,560	....	1,380	....	785	590	....	325	....	1,900

NOTE.—Daily discharge computed from a rating curve fairly well defined below 3,320 second-feet (gage height 3.5 feet).

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for 1912.

[Drainage area, 828 square miles.]

Month.	Discharge in second-feet.				Run-off depth in inches on drainage area.	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	5,260	530	1,380	1.67	1.92	B.
February	5,620	785	1,860	2.25	2.43	B.
March	10,600	1,580	3,570	4.31	4.97	C.
April	12,700	1,480	3,140	3.79	4.23	C.
May	4,220	940	2,010	2.43	2.80	B.
June	1,100	530	765	.924	1.03	B.
July	2,370	530	1,060	1.28	1.48	B.
August	2,500	475	800	.966	1.11	B.
September	1,190	285	513	.620	.69	B.
October	475	285	352	.425	.49	C.
November	1,100	285	422	.510	.57	B.
December	1,900	285	518	.626	.72	B.
The year	12,700	285	1,370	1.65	22.44	

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

Location.—At Virginia & Southwestern Railway bridge near Austins Mill, a small railroad station, and 3 miles south of Rogersville. Station 150 feet below the mouth of Honeycut Creek and about 2 miles below Dodson Creek, both small streams from the south.

Records available.—March 10, 1902, to December 31, 1912. Gage heights furnished by United States Weather Bureau. Discharge measurements were begun in

1904 by the United States Geological Survey. No gage heights or estimates of flow have been published by the United States Geological Survey prior to January 1, 1904, but it is thought that the 1904 discharge rating curve is applicable to the United States Weather Bureau gage heights back to the beginning.

Drainage area.—3,060 square miles.

Gage.—Vertical staff attached to downstream side of bridge pier nearest the right bank; datum unchanged.

Channel.—Practically permanent; section good for measurements.

Discharge measurements.—Made from top of the high-decked steel railroad bridge. A new highway bridge has recently been built half a mile above. The section at the new bridge appears to be good for measurements, and if it proves so it will be the regular place for future measurements.

Floods.—The flood of January 23 and 24, 1906, reached a maximum height of 17.5 feet by the gage datum. The stage was 15.0 feet on the morning of January 24.

Winter flow.—Ice does not affect the flow to any considerable extent.

Accuracy.—Discharge measurements made November 28, 1911, and June 21, 1912, indicate a change in the relation of gage height to discharge as expressed by the discharge rating curve used from 1906 to 1910. The last previous discharge measurement was made March 16, 1909. Estimates of discharge for 1911 and 1912 are based on a new rating curve. Published estimates of discharge for 1910 should be used with caution as noted in the last paragraph of the description of this station in Water-Supply Paper 283. The change may be due to some change in the gage when the bridge was reconstructed during 1910, but this probably does not affect the 1911 or 1912 data.

Cooperation.—The United States Weather Bureau has maintained the gage and furnished all the gage-height records.

The following discharge measurement was made by W. E. Hall:

June 21, 1912: Gage height, 2.12 feet; discharge, 2,130 second-feet.

Daily gage height, in feet, of Holston River near Rogersville, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	4.8	3.9	5.2	5.9	2.8	2.2	2.3	1.9	1.8	1.5	1.5
2	3.5	3.9	3.5	8.4	5.0	2.5	2.4	2.3	1.9	1.8	1.6	1.5
3	3.3	3.5	3.2	14.4	4.3	2.4	2.4	2.4	1.8	1.8	1.6	1.6
4	3.1	3.0	3.2	9.1	4.0	2.4	2.8	2.2	1.8	1.7	1.5	2.0
5	2.9	2.9	3.3	6.0	4.0	2.4	2.9	2.0	1.7	1.7	1.5	2.6
6	2.4	2.5	3.8	5.0	3.8	2.4	3.5	2.0	1.7	1.7	1.5	3.1
7	2.2	2.5	4.0	4.6	3.6	2.3	3.3	2.0	1.7	1.6	1.6	2.7
8	2.2	2.5	4.0	4.4	4.0	2.4	3.0	1.9	1.7	1.6	2.2	2.4
9	2.5	2.5	4.8	4.2	4.2	2.3	2.5	1.9	1.7	1.6	2.8	2.1
10	2.5	2.4	6.5	3.9	3.9	2.2	2.6	1.9	1.9	1.6	2.4	2.1
11	2.4	2.4	5.6	3.8	3.6	2.1	3.1	2.0	1.8	1.6	2.0	2.0
12	2.4	2.4	4.7	3.6	3.3	2.1	3.2	2.2	1.7	1.6	1.8	1.9
13	2.2	2.4	4.8	3.4	3.2	2.0	2.9	2.0	1.7	1.6	1.7	1.9
14	2.0	2.3	6.0	3.2	3.2	1.9	2.7	1.9	1.6	1.7	1.7	1.8
15	2.0	2.2	6.0	3.2	3.0	1.9	2.5	1.9	1.6	1.9	1.7	1.8
16	2.0	2.5	8.8	3.3	3.0	2.9	2.4	1.9	1.7	1.9	1.8	1.6
17	2.0	2.6	8.4	4.5	5.1	2.8	2.2	2.0	1.7	1.8	1.7	1.6
18	2.0	2.6	5.5	4.0	4.8	2.4	2.1	1.8	1.7	1.8	1.7	1.7
19	2.4	2.6	4.7	4.0	4.0	2.4	2.0	1.8	1.9	1.8	1.7	1.7
20	2.7	2.6	4.3	3.7	3.6	2.4	2.4	2.2	2.0	1.7	1.7	1.7
21	3.6	3.3	4.0	3.4	3.3	2.3	2.8	2.4	2.0	1.8	1.6	1.6
22	3.3	5.1	3.6	3.3	2.9	2.2	2.8	3.4	1.8	1.7	1.6	1.6
23	2.9	6.0	3.5	4.4	2.7	2.0	2.7	2.9	2.1	1.6	1.5	1.6
24	2.6	4.3	3.6	4.4	2.7	2.2	2.7	2.6	2.2	1.6	1.5	1.7
25	2.5	4.0	4.2	3.8	2.7	2.3	4.2	2.7	2.6	1.6	1.5	1.6
26	2.4	4.0	5.0	3.5	2.6	2.3	3.0	2.4	2.3	1.6	1.5	1.6
27	2.4	4.4	4.6	3.8	2.6	2.3	3.2	2.2	2.0	1.6	1.5	1.6
28	2.5	5.2	4.0	5.4	2.4	2.4	2.7	2.1	1.9	1.6	1.5	1.7
29	3.1	4.5	6.6	5.5	2.8	2.6	2.5	1.9	1.9	1.6	1.6	1.7
30	5.0	....	10.1	6.6	3.2	2.4	2.2	1.9	1.9	1.6	1.6	2.3
31	6.4	....	6.7	....	3.2	....	2.1	2.0	....	1.6	....	3.2

Daily discharge, in second-feet, of Holston River near Rogersville, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,930	9,850	6,840	11,400	14,200	3,720	2,350	2,560	1,760	1,570	1,030	1,030
2	5,630	6,840	5,630	24,200	10,600	3,000	2,780	2,560	1,760	1,570	1,210	1,030
3	5,050	5,630	4,770	48,200	8,120	2,780	2,780	2,780	1,570	1,570	1,210	1,210
4	4,500	4,230	4,770	27,000	7,150	2,780	3,720	2,350	1,570	1,390	1,030	1,950
5	3,970	3,970	5,050	14,600	7,150	2,780	3,970	1,950	1,390	1,390	1,030	3,230
6	2,780	3,000	6,530	10,600	6,530	2,780	5,630	1,950	1,390	1,390	1,030	4,500
7	2,350	3,000	7,150	9,140	5,930	2,560	5,050	1,950	1,390	1,210	1,210	3,470
8	2,350	3,000	7,150	8,460	7,150	2,780	4,230	1,760	1,390	1,210	2,350	2,780
9	3,000	3,000	9,850	7,790	7,790	2,560	3,000	1,760	1,390	1,210	3,720	2,150
10	3,000	2,780	16,600	6,840	6,840	2,350	3,230	1,760	1,760	1,210	2,780	2,150
11	2,780	2,780	13,000	6,530	5,930	2,150	4,500	1,950	1,570	1,210	1,950	1,950
12	2,780	2,780	9,490	5,930	5,050	2,150	4,770	2,350	1,390	1,210	1,570	1,760
13	2,350	2,780	9,850	5,340	4,770	1,950	3,970	1,950	1,390	1,210	1,390	1,760
14	1,950	2,560	14,600	4,770	4,770	1,760	3,470	1,760	1,210	1,390	1,390	1,570
15	1,950	2,350	14,600	4,770	4,230	1,760	3,000	1,760	1,210	1,760	1,390	1,570
16	1,950	3,000	25,800	5,050	4,230	3,970	2,780	1,760	1,390	1,760	1,570	1,210
17	1,950	3,230	24,200	8,800	11,000	3,720	2,350	1,950	1,390	1,570	1,390	1,210
18	1,950	3,230	12,600	7,150	9,850	2,780	2,150	1,570	1,390	1,570	1,390	1,390
19	2,780	3,230	9,490	7,150	7,150	2,780	1,950	1,570	1,760	1,570	1,390	1,390
20	3,470	3,230	8,120	6,230	5,930	2,780	2,780	2,350	1,950	1,390	1,390	1,390
21	5,930	5,050	7,150	5,340	5,050	2,560	3,720	2,780	1,950	1,570	1,210	1,210
22	5,050	11,000	5,930	5,050	3,970	2,350	3,720	5,340	1,570	1,390	1,210	1,210
23	3,970	14,600	5,630	8,460	3,470	1,950	3,470	3,970	2,150	1,210	1,030	1,210
24	3,230	8,120	5,930	8,460	3,470	2,350	3,470	3,230	2,350	1,210	1,030	1,390
25	3,000	7,150	7,790	6,530	3,470	2,560	7,790	3,470	3,230	1,210	1,030	1,210
26	2,780	7,150	10,600	5,630	3,230	2,560	4,230	2,780	2,560	1,210	1,030	1,210
27	2,780	8,460	9,140	6,530	3,230	2,560	4,770	2,350	1,950	1,210	1,030	1,210
28	3,000	11,400	7,150	12,200	2,780	2,780	3,470	2,150	1,760	1,210	1,030	1,390
29	4,500	8,800	17,000	12,600	3,720	3,230	3,000	1,760	1,760	1,210	1,210	1,390
30	10,600	....	31,000	17,000	4,770	2,780	2,350	1,760	1,760	1,210	1,210	2,560
31	16,200	....	17,400	....	4,770	....	2,150	1,950	....	1,210	....	4,770

NOTE.—Daily discharge computed from a rating curve fairly well defined between 1,030 and 12,600 second-feet (gage heights, 1.5 and 5.5 feet), and assumed a tangent above 10,600 second-feet (gage height, 5.0 feet). See "Accuracy," in station description.

Monthly discharge of Holston River near Rogersville, Tenn., for 1912.

[Drainage area, 3,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.[a]
	Maximum.	Minimum.	Mean.	Per square mile.		
January	16,200	1,950	3,980	1.30	1.50	B.
February	14,600	2,350	5,390	1.76	1.90	B.
March	31,000	4,770	11,000	3.59	4.14	C.
April	48,200	4,770	10,600	3.46	3.86	C.
May	14,200	2,780	6,010	1.96	2.26	B.
June	3,970	1,760	2,650	.866	.97	A.
July	7,790	1,950	3,570	1.17	1.35	A.
August	5,340	1,570	2,320	.758	.87	A.
September	3,230	1,210	1,700	.556	.62	B.
October	1,760	1,210	1,360	.444	.51	B.
November	3,720	1,030	1,410	.461	.51	B.
December	4,770	1,030	1,850	.605	.70	B.
The year	48,200	1,030	4,320	1.41	19.19	

[a] See "Accuracy" in station description.

DOE RIVER AT BLEVINS, TENN.

Location.—At Eastern Tennessee & Western North Carolina Railroad bridge, one-fourth mile west of Blevins, Tenn., 4½ miles above the mouth of Little Doe River.

Records available.—December 16, 1911, to December 31, 1912.

Drainage area.—62.2 square miles.

Gage.—Standard chain gage attached to bridge.

Channel.—Bottom sandy; may shift.

Discharge measurements.—Made from upstream side of bridge or by wading at section about one-fourth mile above bridge.

Point of zero flow.—A determination by leveling September 10, 1912, indicates that there would be no flow past the gage if the river were to fall to a stage of about 1.2 feet.

Winter flow.—The relation of gage height to discharge may be occasionally affected by ice, but only for short periods during unusually severe winters.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by wading by A. H. Horton: September 11, 1912: Gage height, 1.69 feet; discharge, 24.8 second-feet.

Daily gage height, in feet, of Doe River at Blevins, Tenn., for 1912.

[C. A. Johnson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.10	2.15	....	2.46	2.46	1.93	1.88	1.89	1.73	1.74	1.72	2.00
2	2.04	2.03	....	2.93	2.80	1.91	1.84	1.87	1.73	1.72	1.73	1.99
3	2.02	2.06	....	2.59	2.33	2.11	1.87	1.91	1.78	1.72	1.71	1.88
4	1.98	2.08	2.05	2.40	2.24	1.97	2.24	1.91	1.71	1.72	1.72	1.88
5	1.84	2.00	2.04	2.27	2.24	1.95	2.24	1.84	1.71	1.70	1.69	1.92
6	2.10	2.10	2.06	2.21	2.22	1.99	2.06	1.84	1.69	1.70	1.70	1.92
7	2.20	2.10	2.06	2.22	2.25	1.97	1.92	1.82	1.78	1.70	2.52	1.88
8	2.14	2.08	2.11	2.13	2.22	1.89	2.26	1.80	1.82	1.70	2.06	1.82
9	2.11	1.96	2.32	2.07	2.12	1.86	2.16	1.81	1.78	1.70	1.95	1.79
10	2.06	1.98	2.22	2.07	2.10	1.87	2.04	1.86	1.72	1.69	1.86	1.81
11	[a] 2.10	2.06	2.14	2.04	2.06	1.83	2.21	1.82	1.70	1.70	1.83	1.80
12	[a] 2.00	2.07	2.32	2.01	2.04	1.88	2.09	1.74	1.70	1.68	1.80	1.75
13	2.00	2.13	2.35	2.01	1.97	1.81	2.00	1.77	1.88	1.70	1.82	1.71
14	1.86	1.92	2.32	1.97	1.98	1.91	2.04	1.78	1.74	1.81	1.87	1.66
15	....	1.95	3.75	1.98	2.36	2.20	1.89	1.78	1.74	1.80	1.82	1.64
16	....	1.92	2.85	1.96	2.07	2.04	1.87	1.78	1.74	1.70	1.79	1.61
17	....	1.92	2.39	2.00	2.13	1.91	1.84	1.78	1.72	1.70	1.78	1.63
18	....	1.94	2.29	2.01	2.08	2.10	1.89	1.76	1.80	1.70	1.79	1.75
19	2.22	1.94	2.23	2.02	2.01	1.94	2.86	1.88	1.81	1.77	1.78	1.80
20	2.16	1.95	2.21	1.98	1.99	1.88	2.39	1.86	1.71	1.72	1.74	1.80
21	2.08	2.40	2.17	1.94	1.97	1.82	2.27	1.92	1.70	1.66	1.76	1.80
22	2.06	2.35	2.11	2.34	1.95	1.83	2.24	1.96	1.70	1.70	1.76	1.78
23	2.05	2.22	2.07	2.20	1.93	1.88	2.16	1.88	2.21	1.74	1.75	1.82
24	1.86	2.28	2.35	2.12	1.91	1.85	2.07	1.78	1.94	1.67	1.72	1.89
25	1.86	2.18	2.26	2.06	2.06	1.86	2.45	1.78	1.85	1.70	1.72	1.79
26	1.88	2.63	2.17	2.08	1.91	1.84	2.11	1.78	1.85	1.70	1.74	1.80
27	1.88	2.62	2.15	2.32	1.90	1.83	2.07	1.78	1.89	1.69	1.76	1.92
28	1.84	2.22	2.23	2.26	1.95	1.83	1.98	1.74	1.82	1.68	1.76	1.83
29	2.28	2.20	3.21	2.61	2.28	1.83	1.97	1.72	1.80	1.70	1.72	1.92
30	2.32	....	2.69	3.25	2.05	1.86	1.97	1.78	1.78	1.68	1.84	2.28
31	2.20	....	2.41	....	1.98	....	1.90	1.76	....	1.70	....	1.98

[a] Gage height to top of ice.

NOTE.—Observer reported ice 1 to 3 inches thick Jan. 11-14; ice broken up, Jan. 13; ice broken up, slush ice, Jan. 20. Feb. 29 p. m. to Mar. 4 a. m., gage broken.

DOE RIVER AT VALLEY FORGE, TENN.

Location.—At Eastern Tennessee & Western North Carolina Railroad bridge at Valley Forge, about 4 miles above the mouth of the river.

Records available.—December 11, 1911, to December 31, 1912.

Drainage area.—132 square miles.

Gage.—Standard chain gage attached to bridge.

Channel.—Bottom sandy, may shift.

Discharge measurements.—Made from the upstream side of the bridge or by wading at a section about 40 feet above the bridge. The direction of the current makes a decided angle with the bridge.

Point of zero flow.—A determination by leveling on September 9, 1912, indicated that there would be no flow past the gage if the river were to fall to a stage of about −0.1 foot.

Winter flow.—Ice may affect the relation of gage height to discharge for short periods, but only during unusually severe winters.

Accuracy.—Sufficient data have not been obtained to permit estimates of discharge to be made.

The following discharge measurement was made by wading by A. H. Horton: September 7, 1912: Gage height, 1.24 feet; discharge, 82 second-feet.

Daily gage height, in feet, of Doe River at Valley Forge, Tenn., for 1912.

[W. C. Garrison, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.66	1.68	1.72	2.18	2.37	1.68	1.52	1.40	1.18	1.22	1.10	1.20
2	1.54	1.60	1.62	3.21	2.15	1.61	1.50	1.37	1.15	1.20	1.20	1.34
3	1.54	1.35	1.59	2.62	2.24	1.84	1.50	1.45	1.15	1.16	1.12	1.35
4	1.48	1.48	1.58	2.28	2.10	1.68	1.60	1.46	1.15	1.16	1.10	1.31
5	1.14	1.36	1.60	2.05	2.08	1.53	1.94	1.37	1.30	1.14	1.10	1.34
6	1.19	1.42	1.72	1.91	2.00	1.61	1.72	1.38	1.19	1.14	1.10	1.36
7	1.40	1.30	1.77	2.01	2.00	1.57	1.50	1.30	1.30	1.12	1.94	1.32
8	1.42	1.38	1.85	1.78	1.95	1.48	1.47	1.29	1.30	1.10	1.70	1.26
9	1.49	1.38	2.27	1.74	1.87	1.43	1.66	1.29	1.24	1.10	1.42	1.20
10	1.35	1.36	2.12	1.70	1.77	1.41	1.64	1.36	1.14	1.10	1.32	1.19
11	1.36	1.38	1.99	1.65	1.78	1.35	1.67	1.30	1.11	1.10	1.26	1.22
12	1.32	1.33	1.99	1.62	1.72	1.33	1.70	1.26	1.10	1.08	1.21	1.20
13	1.30	1.38	2.07	1.60	1.68	1.38	1.58	1.21	1.19	1.10	1.19	1.06
14	1.25	1.30	2.07	1.58	1.58	1.45	1.60	1.17	1.18	1.24	1.35	1.15
15	1.30	1.40	3.7	1.56	1.64	2.23	1.47	1.21	1.16	1.28	1.24	1.21
16	1.00	1.40	3.17	1.56	2.00	1.95	1.42	1.21	1.11	1.15	1.20	1.21
17	1.22	1.43	2.67	1.67	1.82	1.67	1.40	1.22	1.14	1.12	1.14	1.16
18	1.31	1.48	2.12	1.57	1.78	1.78	1.49	1.24	1.15	1.12	1.18	1.22
19	1.60	1.42	1.95	1.55	1.65	1.63	2.50	1.32	1.34	1.20	1.18	1.19
20	1.30	1.48	1.91	1.51	1.63	1.52	2.14	1.32	1.16	1.18	1.18	1.04
21	1.32	1.98	1.82	1.51	1.58	1.49	1.92	1.60	1.10	1.11	1.16	1.12
22	1.26	2.08	1.75	2.15	1.53	1.41	1.99	1.65	1.11	1.11	1.15	1.19
23	1.29	1.38	1.72	2.14	1.52	1.45	1.87	1.39	1.60	1.20	1.15	1.10
24	1.28	1.73	2.04	1.90	1.44	1.53	1.72	1.22	1.45	1.18	1.15	1.19
25	1.30	1.80	2.00	1.80	1.64	1.47	1.96	1.22	1.30	1.10	1.14	.95
26	1.32	2.00	1.90	1.71	1.46	1.42	1.78	1.25	1.28	1.10	1.10	1.15
27	1.32	2.13	1.85	2.15	1.49	1.49	1.68	1.22	1.45	1.09	1.06	1.30
28	1.30	1.96	1.82	2.10	1.89	1.36	1.59	1.19	1.30	1.10	1.11	1.19
29	1.65	2.79	3.37	2.52	....	1.32	1.53	1.18	1.30	1.10	1.22	1.25
30	2.10	....	2.66	2.83	1.99	1.50	1.50	1.28	1.25	1.10	1.19	1.60
31	1.78	....	2.21	....	1.76	....	1.49	1.25	....	1.10	....	1.52

NOTE.—Observer made no report relative to ice.

DOE RIVER AT ELIZABETHTON, TENN.

Location.—About 1 mile above mouth of river.

Records available.—June 15, 1907, to June 30, 1908; September 8 to December 31, 1912.

Drainage area.—139 square miles.

Gage.—Staff gage attached to tree on right bank.

Channel.—Gravel, probably permanent.

Discharge measurements.—Made from covered highway bridge about one-half mile below gage, or by wading.

Winter flow.—Ice may affect relation of gage height to discharge for short periods, but only during unusually severe winters.

Artificial control.—The operation of a small power plant above the gage may affect the normal flow of the stream to some extent.

Accuracy.—Gage readings are considered reliable and accurate.

No discharge measurements were made at this station during 1912.

Daily gage height, in feet, of Doe River near Elizabethton, Tenn., for 1912.

[G. C. Dougherty, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		0.62	0.52	0.58	16	0.60	0.59	0.59	0.63
2		.59	.39	.59	17	.57	.56	.58	.58
3		.58	.54	.61	18	.61	.55	.64	.59
4		.53	.52	.60	19	.87	.58	.63	.61
5		.54	.54	.68	20	.61	.62	.59	.57
6		.56	.54	.75	21	.54	.53	.58	.57
7	0.67	.55	.59	.61	22	.58	.52	.57	.58
8	.70	.51	1.05	.65	23	.72	.61	.57	.54
9	.66	.50	.82	.64	24	.80	.61	.55	.59
10	.59	.51	.69	.59	25	.72	.57	.51	.46
11	.51	.54	.65	.61	26	.66	.53	.53	.48
12	.56	.52	.64	.58	27	.84	.52	.56	.50
13	.55	.50	.59	.41	28	.71	.50	.55	.49
14	.61	.59	.69	.51	29	.67	.51	.51	.57
15	.55	.76	.66	.55	30	.63	.51	.54	.67
					31		.53		.96

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

Location.—At Southern Railway bridge one-fourth mile north of the Southern Railway station at Judson, 2½ miles below the mouth of Nantahala River, 1 mile below Alarka Creek, one-fourth mile below Sawyer Branch, and 3 miles above the mouth of Tuckasegee River.

Records available.—June 25, 1896, to December 31, 1912.

Drainage area.—675 square miles.

Gage.—The present gage is a vertical staff in two sections on right bank 100 feet above the bridge. Lower section bolted to rock; upper section on tree. This gage superseded the chain gage on the bridge on July 1, 1905. The staff gage set to read the same as the chain gage at stage 3.0 feet, but owing to slope of water surface its datum was raised 0.5 foot. The original gage was first a wire gage, but afterward a boxed chain gage was used. Although the continuity of the record was interrupted by broken wires and stolen chains the datum of the original gage was not changed.

Channel.—Rough, rocky bottom; section divided by two piers. Current swift and irregular.

Discharge measurements.—Made from downstream side of railroad bridge. Some recent measurements have been made at a trestle for small flume crossing the river about one-fourth mile above the gage, where the section is better.

Winter flow.—Not affected by ice.

Accuracy.—Relation of gage height to discharge does not appear permanent, probably because of moving bowlders at and below the station during floods, when current is very swift. The discharge measurement made September 13, 1912, indicates material change in the channel and as the available data are not sufficient for the development of a new discharge rating curve, estimates of daily and monthly discharge are withheld.

The following discharge measurement was made by W. E. Hall:
September 13, 1912: Gage height, 3.42 feet; discharge, 915 second-feet.

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for 1912.

[Miss E. G. Enloe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4	5.8	5.8	7.6	6.5	4.4	4.4	5.2	3.3	3.5	3.2	3.2
2	5.8	5.2	5.8	7.3	6.1	4.4	4.4	4.2	3.3	3.5	3.6	3.3
3	5.6	5.0	5.8	6.8	5.7	4.4	4.8	4.0	3.25	3.4	3.3	3.6
4	5.4	5.0	5.8	6.4	5.9	4.5	5.0	4.4	3.2	3.4	3.3	3.5
5	5.1	5.0	5.8	6.1	5.4	4.4	5.2	4.2	3.5	3.4	3.3	4.4
6	5.0	4.8	6.2	6.1	5.7	4.5	5.5	4.0	3.35	3.35	3.2	5.1
7	4.9	4.7	5.8	5.9	6.2	4.7	5.2	3.9	3.3	3.3	4.2	4.6
8	5.0	4.6	5.8	5.8	6.0	4.4	4.8	3.9	3.3	3.3	4.0	4.3
9	5.7	4.5	5.9	5.7	5.8	4.2	4.9	4.0	3.4	3.3	3.6	3.9
10	5.0	4.5	5.6	5.7	5.5	4.1	5.1	4.1	3.3	3.2	3.5	3.8
11	4.9	4.5	5.5	5.6	5.4	4.0	5.8	3.9	3.3	3.2	3.4	3.7
12	4.8	4.4	5.6	5.5	5.5	4.0	5.2	3.8	3.35	3.2	3.4	3.6
13	4.8	4.4	5.6	5.4	5.2	4.0	4.8	3.7	3.3	3.2	3.35	3.5
14	4.6	4.4	5.4	5.4	5.1	4.4	4.8	3.7	4.2	3.45	3.6	3.5
15	4.4	5.6	10.4	5.3	5.1	4.8	4.6	3.7	4.2	3.6	3.45	3.4
16	4.3	5.8	9.4	5.4	5.3	4.5	4.5	4.0	3.9	3.35	3.35	3.4
17	4.3	5.5	7.3	5.6	5.1	4.3	4.6	4.0	3.5	3.3	3.3	3.4
18	4.6	5.4	6.6	5.6	5.0	4.1	4.8	4.0	3.6	3.2	3.3	3.6
19	4.9	5.5	6.3	5.3	4.9	4.0	5.0	3.8	3.7	3.8	3.2	3.6
20	4.7	5.5	6.0	5.2	4.8	4.0	5.4	3.7	3.3	4.2	3.2	3.45
21	4.4	7.3	5.8	5.3	4.8	3.9	5.3	3.7	3.3	3.6	3.2	3.4
22	4.3	7.6	5.6	6.6	4.7	3.8	4.9	3.8	3.2	3.4	3.2	3.4
23	4.3	6.4	6.3	6.9	4.7	4.2	4.6	3.8	6.4	3.4	3.2	3.4
24	4.3	6.1	7.8	6.1	4.6	4.5	4.5	3.6	4.8	3.3	3.2	4.0
25	4.2	6.2	7.3	5.7	4.5	5.7	4.4	3.5	4.0	3.3	3.15	3.6
26	4.2	8.6	6.4	5.5	4.5	5.4	4.2	3.6	3.7	3.25	3.1	3.6
27	4.2	7.2	6.1	6.6	4.7	5.0	4.1	3.8	4.1	3.2	3.1	3.8
28	4.1	6.5	6.0	6.7	6.2	4.8	4.0	3.6	3.8	3.2	3.1	3.7
29	7.5	6.2	6.2	6.4	5.2	4.8	4.0	3.45	3.9	3.15	3.2	3.5
30	8.0	....	12.1	7.0	4.7	4.4	4.0	3.4	3.8	3.15	3.1	4.8
31	6.3	....	7.8	....	4.5	....	4.0	3.4	....	3.15	....	4.4

LITTLE TENNESSEE RIVER AT McGHEE, TENN.

Location.—At Louisville & Nashville Railroad bridge, one-third mile south of McGhee and one-half mile below the mouth of Tellico River.

Records available.—November 29, 1904, to December 31, 1912.

Drainage area.—2,470 square miles.

Gage.—Chain gage on crossties, upstream side of the railroad bridge, owned by United States Weather Bureau. Prior to December 1, 1905, the same gage was on the old railroad bridge 1,000 feet below. The present datum is 0.3 foot higher than the original datum, allowing for slope in river measured at gage height 4.0 feet.

Channel.—Mostly sand and gravel but practically permanent.

Discharge measurements.—Made from the downstream side of the railroad bridge.

Floods.—The flood of February 22, 1906, reached a height of 22.2 feet by the gage datum. The United States Weather Bureau reports a height of 39.0 feet March, 1867, and 38.5 feet in 1884.

Point of zero flow.—Report of the United States Engineers shows the controlling ledge below the gage to be about 2.5 feet lower than low water at the gage. Assuming their low water to be the same as lowest records places the point of zero flow at about −0.3 foot by the gage datum.

Winter flow.—Ice does not affect the flow.

Cooperation.—Gage-height records furnished by the United States Weather Bureau.

No discharge measurements were made at this station during 1912.

Daily gage height, in feet, of Little Tennessee River at McGhee, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.6	5.7	5.9	8.2	8.2	4.3	4.1	5.3	3.0	3.1	2.7	2.6
2	5.5	5.2	5.5	11.3	6.8	4.2	4.1	4.6	2.9	3.1	2.9	2.6
3	5.5	4.8	5.2	9.3	6.4	4.1	4.0	3.8	2.9	3.0	3.2	3.1
4	5.3	4.6	5.6	7.8	6.0	4.0	4.3	3.7	2.9	3.0	2.8	3.7
5	4.7	4.4	5.0	6.9	6.3	4.2	4.9	4.1	2.8	2.9	2.7	4.2
6	4.3	4.1	5.9	6.5	6.3	4.0	5.2	3.7	3.2	2.9	2.7	6.8
7	4.3	3.9	5.8	6.2	6.6	4.0	5.0	3.6	2.9	2.9	3.1	5.6
8	4.0	3.7	5.6	6.6	6.9	4.4	4.8	3.4	2.9	2.8	4.3	4.
9	4.7	4.0	6.2	5.6	6.5	4.0	4.3	3.5	2.9	2.8	3.7	3.9
10	4.3	3.9	6.6	5.4	5.7	3.9	5.1	4.0	2.8	2.8	3.2	3.5
11	4.3	4.0	5.7	5.4	5.3	3.7	4.8	3.8	2.8	2.8	3.0	3.5
12	4.2	4.0	5.3	5.2	5.1	3.7	5.7	3.7	2.8	2.7	3.0	3.4
13	4.2	3.8	5.9	5.1	5.1	3.6	4.9	3.5	2.8	3.1	2.9	3.4
14	4.0	3.8	6.0	5.0	4.9	3.6	4.7	3.4	2.8	3.3	2.9	3.3
15	4.0	4.2	6.7	5.2	4.7	4.4	4.5	3.7	2.8	3.5	2.9	3.2
16	3.8	5.6	12.6	5.7	4.6	4.2	4.6	3.5	3.7	3.3	2.9	3.2
17	3.4	5.2	8.6	5.3	5.0	4.1	4.2	3.5	3.2	3.1	2.8	3.1
18	3.2	4.8	7.0	5.8	4.9	3.9	4.2	3.8	2.9	2.8	2.8	3.2
19	3.8	4.4	6.5	5.5	4.4	3.7	4.4	3.7	3.9	2.8	2.8	3.4
20	4.0	4.4	6.5	5.3	4.4	3.6	4.4	3.5	3.2	3.9	2.8	3.3
21	4.0	4.9	5.7	5.1	4.3	3.6	4.6	3.5	2.9	3.4	2.8	3.1
22	3.8	10.3	5.3	5.5	4.2	3.5	4.5	3.4	2.8	3.2	2.7	3.0
23	3.8	6.8	5.3	11.0	4.1	3.5	4.4	3.8	4.5	3.0	2.7	3.0
24	3.7	5.8	7.1	6.8	4.1	3.5	4.4	3.5	6.0	3.0	2.7	3.9
25	3.7	5.9	8.6	5.9	4.1	4.0	4.0	3.4	4.0	2.9	2.7	3.6
26	3.6	6.6	6.7	5.4	4.0	6.0	3.8	3.4	3.5	2.9	2.7	3.4
27	3.6	11.5	6.0	5.9	3.9	4.9	3.7	3.5	4.1	2.8	2.6	3.3
28	3.6	8.0	5.5	10.2	4.1	4.2	3.6	3.4	3.8	2.8	2.6	3.7
29	4.3	6.7	15.0	7.0	4.5	4.6	3.5	3.2	3.6	2.7	2.6	3.4
30	10.9	....	14.8	12.1	6.6	4.2	3.5	3.1	3.4	2.7	2.6	3.6
31	7.2	....	9.6	....	5.3	....	3.4	3.1	....	2.7	....	6.5

Daily discharge, in second-feet, of Little Tennessee River at McGhee, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,000	10,300	10,900	18,200	18,200	6,220	5,680	9,120	2,990	3,200	2,420	2,250
2	9,720	8,820	9,720	28,800	13,700	5,950	5,680	7,060	2,790	3,200	2,790	2,250
3	9,720	7,640	8,820	21,800	12,500	5,680	5,410	4,890	2,790	2,990	3,420	3,200
4	9,120	7,060	10,000	16,900	11,200	5,410	6,220	4,630	2,790	2,990	2,600	4,630
5	7,350	6,500	8,220	14,000	12,200	5,950	7,930	5,680	2,600	2,790	2,420	5,950
6	6,220	5,680	10,900	12,800	12,200	5,410	8,820	4,630	3,420	2,790	2,420	13,700
7	6,220	5,150	10,600	11,800	13,100	5,410	8,220	4,380	2,790	2,790	3,200	10,000
8	5,410	4,630	10,000	13,100	14,000	6,500	7,640	3,800	2,790	2,600	6,220	6,500
9	7,350	5,410	11,800	10,000	12,800	5,410	6,220	4,130	2,790	2,600	4,630	5,150
0	6,220	5,150	13,100	9,420	10,300	5,150	8,520	5,410	2,600	2,600	3,420	4,130
1	6,220	5,410	10,300	9,420	9,120	4,630	7,640	4,890	2,600	2,600	2,990	4,130
2	5,950	5,410	9,120	8,820	8,520	4,630	10,300	4,630	2,600	2,420	2,990	3,890
3	5,950	4,890	10,900	8,520	8,520	4,380	7,930	4,130	2,600	3,200	2,790	3,890
4	5,410	4,890	11,200	8,220	7,930	4,380	7,350	3,890	2,600	3,650	2,790	3,650
5	5,410	5,950	13,400	8,820	7,350	6,500	6,780	4,630	2,600	4,130	2,790	3,420
6	4,890	10,000	33,500	10,300	7,060	5,950	7,060	4,130	4,630	3,650	2,790	3,420
7	3,890	8,820	19,500	9,120	8,220	5,680	5,950	4,130	3,420	3,200	2,600	3,200
8	3,420	7,640	14,300	10,600	7,930	5,150	5,950	4,800	2,790	2,600	2,600	3,420
9	4,800	6,500	12,800	9,720	6,500	4,630	6,500	4,630	5,150	2,600	2,600	3,890
0	5,410	6,500	12,800	9,120	6,500	4,380	6,500	4,130	3,420	5,150	2,600	3,650
1	5,410	7,930	10,300	8,520	6,220	4,380	7,060	4,130	2,790	3,890	2,600	3,200
2	4,890	25,300	9,120	9,720	5,950	4,130	6,780	3,890	2,600	3,420	2,420	2,990
3	4,890	13,700	9,120	27,700	5,680	4,130	6,500	4,890	6,780	2,990	2,420	2,990
4	4,630	10,600	14,600	13,700	5,680	4,130	6,500	4,130	11,200	2,990	2,420	5,150
5	4,630	10,900	19,500	10,900	5,680	5,410	5,410	3,890	5,410	2,790	2,420	4,380
	4,380	13,100	18,400	9,420	5,410	11,200	4,890	3,890	4,130	2,790	2,420	3,890
	4,380	29,500	11,200	10,990	5,150	7,930	4,630	4,130	5,680	2,600	2,250	3,650
	4,380	17,500	9,720	24,900	5,680	5,950	4,380	3,890	4,890	2,600	2,250	4,630
	6,220	13,400	42,600	14,300	6,780	7,060	4,130	3,420	4,380	2,420	2,250	3,890
	27,400	....	41,900	31,700	13,100	5,950	4,130	3,200	3,890	2,420	2,250	4,380
	15,000	....	22,900	....	9,120	....	3,890	3,200	....	2,420	....	12,800

NOTE.—Daily discharge determined by means of a discharge rating curve fairly well defined between 390 and 1,650 second-feet (gage heights 2 and 2.2 feet), well defined between 1,790 and 8,820 second-feet age heights 2.3 and 5.2 feet), and fairly well defined between 9,120 and 24,200 second-feet (gage heights 3 and 10 feet).

Monthly discharge of Little Tennessee River at McGhee, Tenn., for 1912.

[Drainage area, 2,470 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	27,400	3,420	6,930	2.81	3.24	B.
February	29,500	4,630	9,460	3.83	4.13	B.
March	42,600	8,220	14,700	5.95	6.86	B.
April	31,700	8,220	13,700	5.55	6.19	B.
May	18,200	5,150	9,110	3.69	4.25	B.
June	11,200	4,130	5,590	2.26	2.52	A.
July	10,300	3,890	6,470	2.62	3.02	A.
August	9,120	3,200	4,530	1.83	2.11	A.
September	11,200	2,600	3,750	1.52	1.70	A.
October	5,150	2,420	3,000	1.21	1.40	A.
November	6,220	2,250	2,830	1.15	1.28	A.
December	13,700	2,250	4,720	1.91	2.20	A.
The year	42,600	2,250	7,060	2.86	38.90	

TUCKASEGEE RIVER AT BRYSON, N. C.

Location.—At highway bridge in the town of Bryson, half a mile below the mouth of Deep Creek and about 15 miles above the junction of Tuckasegee River with Little Tennessee River.

Records available.—November 7, 1897, to December 31, 1912.

Drainage area.—662 square miles.

Gage.—Vertical staff attached to the right bank bridge pier; datum unchanged.

Channel.—Permanent, or nearly so, as to relation of gage height to discharge, though sandy at section.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Accuracy.—Excellent for low and ordinary stages; discharge rating curves not so well defined for high stages, depending upon one discharge measurement made in 1901.

Discharge measurements of Tuckasegee River at Bryson, N. C., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 13	W. E. Hall	1.32	697
14	do	1.32	661

Daily gage height, in feet, of Tuckasegee River at Bryson, N. C., for 1912.

[J. M. Welch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	2.8	2.5	3.8	3.0	2.0	1.8	2.4	1.35	1.48	1.30	1.20
2	2.5	2.15	2.4	4.0	2.8	1.9	1.8	1.8	1.35	1.40	1.30	1.40
3	2.45	2.0	2.4	3.6	2.6	1.95	1.8	1.9	1.3	1.40	1.25	1.5
4	2.2	2.0	2.35	3.3	2.8	2.0	2.0	2.3	1.35	1.40	1.28	1.65
5	1.95	1.85	2.35	3.0	2.8	1.95	2.15	2.05	1.40	1.45	1.30	2.4
6	1.9	1.9	2.6	2.8	2.7	2.15	2.2	1.75	1.35	1.35	1.6	2.8
7	1.9	1.8	2.4	3.0	3.1	2.2	2.25	1.8	1.35	1.32	1.85	2.0
8	1.9	1.8	2.45	2.8	2.8	1.95	2.9	1.85	1.35	1.30	1.8	1.7
9	2.15	1.75	2.6	2.6	2.6	1.9	2.15	2.05	1.35	1.30	1.55	1.6
10	1.9	1.8	2.45	2.5	2.45	1.8	2.05	1.9	1.3	1.30	1.40	1.5
11	1.85	1.7	2.3	2.4	2.6	1.75	2.8	1.6	1.3	1.30	1.35	1.5
12	1.8	1.7	2.4	2.4	2.5	1.7	2.4	1.55	1.3	1.25	1.30	1.45
13	1.8	1.65	2.4	2.3	2.4	1.7	2.15	1.6	1.32	1.25	1.30	1.45
14	1.7	1.7	2.3	2.35	2.3	2.15	2.1	1.5	1.30	1.5	1.30	1.38
15	1.7	2.0	6.0	2.3	2.2	1.95	2.0	1.75	1.48	1.55	1.30	1.35
16	1.55	2.0	4.2	2.3	2.6	1.85	2.05	1.6	1.45	1.35	1.25	1.35
17	1.8	1.9	3.4	2.4	2.2	1.7	1.95	1.85	1.32	1.30	1.25	1.35
18	1.65	1.9	3.2	2.5	2.1	1.7	2.1	1.8	1.55	1.30	1.25	1.5
19	2.0	1.8	2.8	2.3	2.1	1.65	2.2	1.7	1.30	1.7	1.25	1.45
20	1.8	1.9	2.6	2.25	2.0	1.6	2.2	1.6	1.25	1.6	1.25	1.35
21	1.7	3.4	2.6	2.2	1.95	1.6	2.3	1.55	1.25	1.40	1.25	1.35
22	1.6	2.9	2.5	3.2	1.9	1.6	2.1	1.6	1.28	1.35	1.25	1.35
23	1.6	2.6	2.7	3.9	1.9	1.65	2.0	1.6	3.5	1.35	1.25	1.40
24	1.6	2.5	4.0	2.6	1.9	1.75	1.9	1.5	1.9	1.32	1.25	1.40
25	1.6	2.5	3.2	2.45	1.85	3.2	2.15	1.45	1.6	1.30	1.20	1.45
26	1.6	4.4	2.8	2.4	1.8	2.2	1.8	1.5	1.85	1.30	1.20	1.38
27	1.6	3.8	2.7	3.2	1.9	2.0	1.7	1.6	1.9	1.28	1.20	1.5
28	1.55	3.2	2.6	2.9	2.05	1.9	1.7	1.4	1.6	1.30	1.22	1.42
29	4.2	2.8	6.4	3.4	3.3	1.9	1.65	1.4	1.55	1.30	1.15	1.40
30	3.6	....	4.2	3.6	2.4	1.9	1.65	1.45	1.5	1.45	1.20	2.6
31	2.7	....	3.6	....	2.15	....	1.6	1.4	....	1.32	....	2.15

Daily discharge, in second-feet, of Tuckasegee River at Bryson, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,290	2,160	2,520	5,290	3,490	1,660	1,350	2,340	755	906	700	600
2	2,520	1,900	2,340	5,800	3,090	1,500	1,350	1,350	755	810	700	810
3	2,430	1,660	2,340	4,800	2,710	1,580	1,350	1,500	700	810	650	930
4	1,990	1,660	2,250	4,110	3,090	1,660	1,660	2,160	755	810	680	1,130
5	1,580	1,420	2,250	3,490	3,090	1,580	1,900	1,740	810	870	700	2,340
6	1,500	1,500	2,710	3,090	2,900	1,900	1,990	1,280	755	755	1,060	3,090
7	1,500	1,350	2,340	3,490	3,690	1,990	2,080	1,350	755	722	1,420	1,660
8	1,500	1,350	2,430	3,090	3,090	1,580	3,290	1,420	755	700	1,350	1,200
9	1,900	1,280	2,710	2,710	2,710	1,500	1,900	1,740	755	700	995	1,060
10	1,500	1,350	2,430	2,520	2,430	1,350	1,740	1,500	700	700	810	930
11	1,420	1,200	2,160	2,340	2,710	1,280	3,090	1,060	700	700	755	930
12	1,350	1,200	2,340	2,340	2,520	1,200	2,340	995	700	650	700	870
13	1,350	1,130	2,340	2,160	2,340	1,200	1,900	1,060	722	650	700	870
14	1,200	1,200	2,160	2,250	2,160	1,900	1,820	930	700	930	700	788
15	1,200	1,660	13,200	2,160	1,990	1,580	1,660	1,280	906	995	700	755
16	995	1,660	6,350	2,160	2,710	1,420	1,740	1,060	870	755	650	755
17	1,350	1,500	4,330	2,340	1,990	1,200	1,580	1,420	722	700	650	755
18	1,130	1,500	3,900	2,520	1,820	1,200	1,820	1,350	995	700	650	930
19	1,660	1,350	3,090	2,160	1,820	1,130	1,990	1,200	700	1,200	650	870
20	1,350	1,500	2,710	2,080	1,660	1,060	1,990	1,060	650	1,060	650	755
21	1,200	4,330	2,710	1,990	1,580	1,060	2,160	995	650	810	650	755
22	1,060	3,290	2,520	3,900	1,500	1,060	1,820	1,060	680	755	650	755
23	1,060	2,710	2,900	5,540	1,500	1,130	1,660	1,060	4,560	755	650	810
24	1,060	2,520	5,800	2,710	1,500	1,280	1,500	930	1,500	722	650	810
25	1,060	2,520	3,900	2,430	1,420	3,900	1,900	870	1,060	700	600	870
26	1,060	6,920	3,090	2,340	1,350	1,990	1,350	930	1,420	700	600	788
27	1,060	5,290	2,900	3,900	1,500	1,660	1,200	1,060	1,500	680	600	930
28	995	3,900	2,710	3,290	1,740	1,500	1,200	810	1,060	700	620	834
29	6,350	3,090	15,500	4,330	4,110	1,500	1,130	810	995	700	550	810
30	4,800	....	6,350	4,800	2,340	1,500	1,130	870	930	870	600	2,710
31	2,900	....	4,800	....	1,900	....	1,060	810	....	722	....	1,900

NOTE.—Daily discharge determined by means of a discharge rating curve that is well defined below 3,460 second-feet (gage height, 3.0 feet) and poorly defined above that point.

Monthly discharge of Tuckasegee River at Bryson, N. C., for 1912.

[Drainage area, 662 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	6,350	995	1,780	2.69	3.10	B.
February	6,920	1,180	2,210	3.34	3.60	B.
March	15,500	2,160	3,870	5.85	6.74	C.
April	5,800	1,990	3,200	4.83	5.39	B.
May	4,110	1,350	2,340	3.53	4.07	B.
June	3,900	1,060	1,540	2.33	2.60	B.
July	3,290	1,080	1,760	2.66	3.07	B.
August	2,340	810	1,230	1.86	2.14	A.
September	4,560	650	984	1.49	1.66	A.
October	1,200	650	782	1.18	1.36	A.
November	1,420	550	735	1.11	1.24	B.
December	3,090	600	1,100	1.66	1.91	B.
The year	15,500	550	1,790	2.70	36.88	

NOTE.—See footnote to table of daily discharge and discussion under "Accuracy" in station description.

HIWASSEE RIVER AT MURPHY, N. C.

Location.—At highway bridge near the Louisville & Nashville Railroad station, half a mile above the mouth of Valley River.

Records available.—June 26, 1896, to August 8, 1897; October 19, 1897, to December 31, 1912.

Drainage area.—410 square miles.

Gage.—Chain gage attached to downstream side of bridge. Original wire-rope gage was near the same point on bridge. Datum unchanged since October 20, 1897. Record of datum of former gage was lost when wire rope broke August 8, 1897.

Channel.—Permanent; rough; rock bottom at measuring section. Controlling bar below is of less permanent nature, being of rock and gravel. Rebuilding railroad bridge piers 80 feet downstream has also changed channel and relation of gage height to discharge to some extent.

Discharge measurements.—Made from the upstream side of bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

The following discharge measurement was made by W. E. Hall:

September 12, 1912: Gage height, 5.22 feet; discharge, 345 second-feet.

Daily gage height, in feet, of Hiwassee River at Murphy, N. C., for 1912.

[Miss Willie Mingus, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	6.45	6.6	7.2	7.8	6.0	6.0	6.3	5.28	5.4	5.3	5.25
2	6.45	6.25	6.4	7.2	6.7	5.9	6.05	5.7	5.28	5.35	5.5	5.25
3	6.4	6.05	6.3	7.0	6.55	5.9	6.0	5.65	5.28	5.3	5.3	5.5
4	6.15	6.1	6.4	6.8	6.45	5.8	6.35	6.05	5.23	5.3	5.3	5.35
5	6.0	5.85	6.25	6.7	6.4	5.85	6.2	5.7	5.43	5.45	5.3	5.95
6	5.85	5.95	6.7	6.6	6.3	5.85	6.4	5.6	5.28	5.35	5.25	6.55
7	5.85	5.85	6.4	6.55	6.6	6.0	6.35	5.55	5.28	5.3	5.6	6.05
8	5.8	5.8	6.35	6.6	6.4	5.8	6.1	5.55	5.23	5.3	5.7	5.8
9	6.4	5.75	6.55	6.45	6.3	5.75	6.0	5.7	5.33	5.25	5.5	5.65
10	6.0	5.75	6.4	6.4	6.2	5.7	6.3	5.95	5.23	5.25	5.45	5.55
11	5.9	5.75	6.3	6.35	6.15	5.65	6.05	5.65	5.23	5.2	5.4	5.5
12	5.9	5.7	6.3	6.3	6.2	5.6	6.2	5.55	5.23	5.2	5.4	5.5
13	5.85	5.7	6.4	6.25	6.1	5.6	6.0	5.5	5.25	5.2	5.35	5.5
14	5.8	5.7	6.3	6.2	6.0	5.6	6.0	5.5	5.2	5.3	5.6	5.4
15	5.85	6.55	9.1	6.2	6.0	6.1	6.05	5.5	5.6	5.5	5.4	5.4
16	5.6	7.1	8.0	6.55	6.1	6.0	9.0	5.5	5.4	5.3	5.35	5.4
17	5.9	6.55	7.2	6.35	6.05	5.85	5.9	5.43	5.3	5.2	5.3	5.35
18	5.65	6.45	6.9	6.55	5.9	5.75	9.0	5.8	5.2	5.2	5.3	5.5
19	5.75	6.4	6.7	6.25	5.9	5.7	9.4	5.5	5.35	5.5	5.3	5.4
20	5.75	6.3	6.55	6.2	5.8	5.7	6.7	5.43	5.2	6.1	5.3	5.4
21	5.7	6.35	6.45	6.2	5.8	5.6	6.4	5.38	5.2	5.6	5.3	5.35
22	5.65	7.4	6.35	6.4	5.8	5.6	6.15	5.5	5.2	5.5	5.3	5.35
23	5.6	6.85	6.3	7.1	5.8	5.55	6.0	5.6	7.9	5.5	5.3	5.35
24	5.6	6.55	7.6	6.65	5.75	5.7	5.9	5.43	5.95	5.4	5.25	5.5
25	5.6	6.6	7.4	6.45	5.7	7.0	5.85	5.38	5.6	5.55	5.25	5.45
26	5.6	7.2	7.8	6.35	5.7	6.3	5.8	5.38	5.5	5.25	5.25	5.45
27	5.55	7.8	6.65	6.55	6.0	6.0	5.7	5.43	5.6	5.3	5.25	5.5
28	5.55	7.1	6.55	7.0	6.05	5.9	5.75	5.38	5.45	5.3	5.25	5.5
29	6.85	6.8	11.7	7.0	7.2	7.0	5.6	5.28	5.45	5.3	5.25	5.5
30	7.9	....	8.3	7.2	6.65	6.0	5.6	5.28	5.45	5.25	5.25	5.55
31	6.9	....	9.5	....	6.2	....	6.3	5.28	....	5.25	....	5.85

Daily discharge, in second-feet, of Hiwassee River at Murphy, N. C., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,990	1,440	1,610	2,430	3,470	975	975	1,270	391	475	405	370
2	1,440	1,220	1,380	2,430	1,730	885	1,020	710	391	440	550	370
3	1,380	1,020	1,270	2,130	1,550	885	975	670	391	405	405	550
4	1,120	1,070	1,380	1,860	1,440	795	1,320	1,020	356	405	405	440
5	975	840	1,220	1,730	1,380	840	1,170	710	498	512	405	930
6	840	930	1,730	1,610	1,270	840	1,380	630	391	440	370	1,550
7	840	840	1,380	1,550	1,610	975	1,320	590	391	405	630	1,020
8	795	795	1,320	1,610	1,380	795	1,070	590	356	405	710	795
9	1,380	752	1,550	1,440	1,270	752	975	710	426	370	550	670
10	975	752	1,380	1,380	1,170	710	1,270	930	356	370	512	590
11	885	752	1,270	1,320	1,120	670	1,020	670	356	335	475	550
12	885	710	1,270	1,270	1,170	630	1,170	590	356	335	475	550
13	840	710	1,380	1,220	1,070	630	975	550	370	335	440	550
14	795	710	1,270	1,170	975	630	975	550	335	405	630	475
15	840	1,550	6,170	1,170	975	1,070	1,020	550	630	550	475	475
16	630	2,280	3,850	1,550	1,070	975	5,950	550	475	405	440	475
17	885	1,550	2,430	1,320	1,020	840	885	498	405	335	405	440
18	670	1,440	1,990	1,550	885	752	5,950	795	335	335	405	550
19	752	1,380	1,730	1,220	885	710	6,860	550	440	550	405	475
20	752	1,270	1,550	1,170	795	710	1,730	498	335	1,070	405	475
21	710	1,320	1,440	1,170	795	630	1,380	461	335	630	405	440
22	670	2,760	1,320	1,380	795	630	1,120	550	335	550	405	440
23	630	1,920	1,270	2,280	795	590	975	630	3,660	550	405	440
24	630	1,550	3,110	1,670	752	710	885	498	930	475	370	550
25	630	1,610	2,760	1,440	710	2,130	840	461	630	590	370	512
26	630	2,430	3,470	1,320	710	1,270	795	461	550	370	370	512
27	590	3,470	1,670	1,550	975	975	710	498	630	405	370	550
28	590	2,280	1,550	2,130	1,020	885	752	461	512	405	370	550
29	1,920	1,860	12,700	2,130	2,430	2,130	630	391	512	405	370	550
30	3,660	....	4,450	2,430	1,670	975	630	391	512	370	370	590
31	1,990	....	7,090	....	1,170	....	1,270	391	....	370	....	840

NOTE.—Daily discharge computed from a rating curve well defined between 270 and 3,290 second-feet (gage heights 5.1 and 7.7 feet), above which it is poorly defined.

Monthly discharge of Hiwassee River at Murphy, N. C., for 1912.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,660	590	1,040	2.54	2.93	B.
February	3,470	710	1,420	3.46	3.73	B.
March	12,700	1,220	2,510	6.12	7.06	C.
April	2,430	1,170	1,620	3.95	4.41	A.
May	3,470	710	1,230	3.00	3.46	B.
June	2,130	590	900	2.20	2.46	A.
July	6,860	630	1,550	3.78	4.36	B.
August	1,270	391	607	1.48	1.71	A.
September	3,660	335	553	1.35	1.51	A.
October	1,070	335	452	1.10	1.27	A.
November	710	370	443	1.08	1.20	A.
December	1,550	370	589	1.44	1.66	A.
The year	12,700	335	1,080	2.63	35.76	

HIWASSEE RIVER AT RELIANCE, TENN.

Location.—At Louisville & Nashville Railroad bridge at Reliance, Tenn., 1 mile below the mouth of Lost Creek and 2 miles above Spring Creek.

Records available.—August 17, 1900, to December 31, 1911.

Drainage area.—1,180 square miles.

Gage.—Vertical staff attached to a tree on right bank 150 feet above the bridge. On August 3, 1911, the gage was raised 0.10 foot to agree with the original datum.

Channel.—Section is in a pool above a rock ledge diagonally across the river. At lower end of ledge is a small corn mill with some addition to the natural dam, probably varying in extent.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Artificial control.—None above. The small mill below may affect the low-water flow.

The following discharge measurement was made by W. E. Hall:

September 10, 1912: Gage height, 1.28 feet; discharge, 1,020 second-feet.

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for 1912.

[C. V. Higdon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	2.6	2.8	3.6	3.4	2.2	2.2	2.0	1.3	1.4	1.3	1.25
2	2.7	2.35	2.6	3.7	3.0	2.05	2.2	2.0	1.25	1.4	1.3	1.25
3	2.45	2.15	2.6	3.4	2.8	2.0	2.1	1.7	1.15	1.65	1.4	1.35
4	2.3	2.1	2.6	3.0	2.8	2.0	2.1	1.7	1.15	1.65	1.35	1.5
5	2.2	2.05	2.4	2.9	2.7	2.0	2.7	1.75	1.2	1.7	1.3	1.55
6	1.9	1.85	2.6	2.8	2.6	2.0	2.9	1.65	1.25	1.4	1.35	2.7
7	1.9	1.8	2.6	2.8	3.0	2.1	2.6	1.55	1.35	1.25	1.45	2.4
8	1.85	1.8	2.5	2.9	3.0	2.0	2.6	1.5	1.35	1.3	2.2	2.0
9	2.4	1.75	2.8	2.7	2.6	1.9	2.6	1.65	1.3	1.2	1.7	1.8
10	2.25	1.7	2.7	2.6	2.5	1.8	2.5	2.15	1.3	1.25	1.45	1.7
11	2.15	1.8	2.45	2.5	2.4	1.75	2.5	1.85	1.2	1.25	1.45	1.6
12	1.95	1.7	2.45	2.45	2.4	1.75	2.9	1.65	1.2	1.2	1.45	1.55
13	1.9	1.7	2.5	2.4	2.35	1.7	2.3	1.6	1.2	1.2	1.4	1.5
14	1.9	1.8	2.5	2.35	2.35	2.9	2.2	1.55	1.15	1.25	1.4	1.4
15	1.95	2.8	3.8	2.35	2.2	3.0	2.25	1.85	1.2	1.7	1.4	1.4
16	2.0	3.4	5.3	2.4	2.3	2.8	2.25	1.7	1.7	1.5	1.35	1.4
17	1.6	3.0	3.7	2.6	2.25	2.8	2.2	1.5	1.45	1.3	1.35	1.4
18	1.7	2.5	3.3	3.0	2.1	2.5	2.25	1.7	1.4	1.3	1.35	1.55
19	1.8	2.7	2.7	2.6	2.1	1.9	2.3	1.6	1.4	1.5	1.35	1.65
20	1.9	2.6	2.6	2.4	2.0	1.85	2.3	1.5	1.35	3.2	1.3	1.6
21	1.95	2.4	2.6	2.4	2.0	1.75	2.6	1.5	1.25	1.9	1.3	1.5
22	1.65	4.3	2.5	2.8	1.95	1.7	2.2	1.7	1.2	1.65	1.3	1.4
23	1.65	3.2	2.4	4.3	1.95	1.65	2.0	1.9	2.5	1.45	1.3	1.4
24	1.6	2.8	3.5	3.8	1.9	1.65	2.0	1.6	2.7	1.5	1.25	1.6
25	1.6	2.8	4.0	2.8	1.9	1.75	1.9	1.5	1.9	1.45	1.3	1.75
26	1.55	3.7	3.1	2.6	1.85	2.8	1.8	1.4	1.6	1.4	1.3	1.6
27	1.55	5.0	2.9	3.4	1.8	2.6	1.7	1.4	1.6	1.35	1.3	1.6
28	1.5	4.1	2.7	4.2	1.65	2.2	1.6	1.4	1.65	1.3	1.25	1.7
29	2.6	3.1	9.3	3.4	2.7	2.05	1.65	1.35	1.5	1.3	1.25	1.6
30	4.9	......	5.9	3.8	3.8	2.2	1.6	1.35	1.5	1.3	1.25	1.8
31	3.2	......	4.1	......	2.5	......	1.6	1.35	......	1.3	......	2.2

Daily discharge, in second-feet, of Hiwassee River at Reliance, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,590	3,730	4,300	6,940	6,240	2,710	2,710	2,260	1,040	1,180	1,040	975
2	4,010	3,080	3,730	7,300	4,910	2,370	2,710	2,260	975	1,180	1,040	975
3	3,330	2,600	3,730	6,240	4,300	2,260	2,480	1,660	850	1,580	1,180	1,110
4	2,950	2,480	3,730	4,910	4,300	2,260	2,480	1,660	850	1,580	1,110	1,330
5	2,710	2,370	3,200	4,600	4,010	2,260	4,010	1,760	910	1,660	1,040	1,410
6	2,050	1,950	3,730	4,300	3,730	2,260	4,600	1,580	975	1,180	1,110	4,010
7	2,050	1,850	3,730	4,300	4,910	2,480	3,730	1,410	1,110	975	1,260	3,200
8	1,950	1,850	3,460	4,600	4,910	2,260	3,730	1,330	1,110	1,040	2,710	2,260
9	3,200	1,760	4,300	4,010	3,730	2,050	3,730	1,580	1,040	910	1,660	1,850
10	2,830	1,660	4,010	3,730	3,460	1,850	3,460	2,600	1,040	975	1,260	1,660
11	2,600	1,850	3,330	3,460	3,200	1,760	3,460	1,950	910	975	1,260	1,490
12	2,160	1,660	3,330	3,330	3,200	1,760	4,600	1,580	910	910	1,260	1,410
13	2,050	1,660	3,460	3,200	3,080	1,660	2,950	1,490	910	910	1,180	1,330
14	2,050	1,850	3,460	3,080	3,080	4,600	2,710	1,410	850	975	1,180	1,180
15	2,160	4,300	7,660	3,080	2,710	4,910	2,830	1,950	910	1,660	1,180	1,180
16	2,260	6,240	13,700	3,200	2,950	4,300	2,830	1,660	1,660	1,330	1,110	1,180
17	1,490	4,910	7,300	3,730	2,830	4,300	2,710	1,330	1,260	1,040	1,110	1,180
18	1,660	3,460	5,900	4,910	2,480	3,460	2,830	1,660	1,180	1,040	1,110	1,410
19	1,850	4,010	4,010	3,730	2,480	2,050	2,950	1,490	1,180	1,330	1,110	1,580
20	2,050	3,730	3,730	3,200	2,260	1,950	2,950	1,330	1,110	5,560	1,040	1,490
21	2,160	3,200	3,730	3,200	2,260	1,760	3,730	1,330	975	2,050	1,040	1,330
22	1,580	9,550	3,460	4,300	2,160	1,660	2,710	1,660	910	1,580	1,040	1,180
23	1,580	5,560	3,200	9,550	2,160	1,580	2,260	2,050	3,460	1,260	1,040	1,180
24	1,490	4,300	6,590	7,660	2,050	1,580	2,260	1,490	4,010	1,330	975	1,490
25	1,490	4,300	8,400	4,300	2,050	1,760	2,050	1,330	2,050	1,260	1,040	1,760
26	1,410	7,300	5,230	3,730	1,950	4,300	1,850	1,180	1,490	1,180	1,040	1,490
27	1,410	12,400	4,600	6,240	1,850	3,730	1,660	1,180	1,490	1,110	1,040	1,490
28	1,330	8,780	4,010	9,160	1,580	2,710	1,490	1,180	1,580	1,040	975	1,660
29	3,730	5,230	31,600	6,240	4,010	2,370	1,580	1,110	1,330	1,040	975	1,490
30	12,000	......	16,300	7,660	7,660	2,710	1,490	1,110	1,330	1,040	975	1,850
31	5,560	......	8,780	......	3,460	......	1,490	1,110	......	1,040	......	2,710

NOTE.—Daily discharge computed from a rating curve well defined between 490 and 3,460 second-feet (gage heights 0.8 and 2.5 feet), and fairly well defined between 3,730 and 6,590 second-feet (gage heights 2.6 and 3.5 feet).

Monthly discharge of Hiwassee River at Reliance, Tenn., for 1912.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	12,000	1,330	2,770	2.35	2.71	B.
February	12,400	1,000	4,060	3.44	3.71	B.
March	31,000	3,200	6,120	5.19	5.98	C.
April	9,550	3,000	4,930	4.18	4.66	B.
May	7,000	1,580	3,350	2.84	3.27	B.
June	4,910	1,580	2,580	2.19	2.44	B.
July	4,000	1,400	2,810	2.38	2.74	B.
August	2,000	1,110	1,570	1.33	1.53	A.
September	4,010	850	1,310	1.11	1.24	A.
October	5,580	910	1,350	1.14	1.31	A.
November	2,710	975	1,170	.992	1.11	A.
December	4,010	975	1,610	1.36	1.57	A.
The year	31,000	850	2,800	2.37	32.27	

OCOEE RIVER AT COPPER HILL, TENN.

Location.—At new highway bridge recently built on site of suspension footbridge, from which discharge measurements were formerly made, in town of Copper Hill, Tenn., one-half mile above the mouth of Fightingtown Creek.

Records available.—March 21, 1903, to December 31, 1912.

Drainage area.—374 square miles.

Gage.—Chain gage attached to upstream side of the bridge, installed August 2, 1911. This gage is near the location of the original sloping gage, a portion of which was cut away for the bridge pier. A temporary vertical staff gage was set September 16, 1910, to read the same as the original sloping gage, and the standard chain gage was set August 2, 1911, to read the same as the temporary gage. The chain gage should therefore read the same as the original sloping gage, i. e., both refer to the same datum. On August 2, 1911, a discrepancy of 0.10 foot between the bench mark and the two gages was found by wye levels, the gages being too high by that amount. It has been assumed that the error was made in the original levels and the recorded elevation of the bench mark changed to agree with the gages. The discharge measurements have been referred to the gages, and so the records of discharge need no revision.

Channel.—Is not permanent, but the relation of gage height to discharge has remained fairly constant.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Ice does not affect the relation of gage height to discharge.

Accuracy.—A new discharge rating curve was used for 1912 which differs from the previous curves principally above 1,200 second-feet, the new curve giving the larger discharge for a given gage height above that point. The change in rating is based chiefly on four discharge measurements made in 1913 (before this report was prepared) and the new curve is well defined between 350 and 3,100 second-feet (gage heights, 0.7 and 4.4 feet) and fairly well defined between 3,200 and 8,700 second-feet (gage heights, 4.5 and 8.0 feet). The highest discharge measurement prior to 1913 was at gage height 3.4 feet, whereas two of the 1913 measurements are at a stage of about 7.5 feet. Errors in estimates of discharge published for previous years, due to what now appears to have been erroneous extensions of the discharge rating curves used, are less than 10 per cent below discharge

3,000 second-feet, but above that point the discharge computations should be revised by those using them on the basis of a rating table derived (as explained on p. 12) from the 1912 data published below. The data for 1911 published in Water-Supply Paper 303 are within the accuracy ratings assigned, but the new 1912 rating curve should probably have been used beginning about October 17, 1911.

The following discharge measurement was made by W. E. Hall:

September 11, 1912: Gage height, 0.93 foot; discharge, 465 second-feet.

Daily gage height, in feet, of Ocoee River at Copper Hill, Tenn., for 1912.

[H. J. Lance, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.0	2.4	3.5	2.8	2.0	1.8	1.8	0.95	1.1	1.2	0.85
2	2.1	1.8	2.4	3.4	2.6	1.9	1.7	1.4	.9	1.0	1.05	.9
3	1.8	1.6	2.4	3.1	2.4	1.8	1.8	1.3	.9	.95	1.0	.85
4	1.6	1.5	2.4	3.0	2.5	2.0	1.6	1.2	.9	1.4	.95	.85
5	1.5	1.5	2.4	2.8	2.4	1.9	2.2	1.3	.95	1.2	.95	1.3
6	1.4	1.5	2.6	2.7	2.4	1.8	2.4	1.2	1.0	1.1	1.0	2.4
7	1.4	1.5	2.4	2.8	2.5	2.0	1.6	1.2	1.0	1.1	1.8	1.6
8	1.5	1.4	2.3	2.6	2.5	1.6	1.8	1.3	1.0	1.0	1.6	1.4
9	2.2	1.35	2.3	2.5	2.4	1.7	1.45	1.35	1.0	.9	1.3	1.3
10	1.6	1.3	2.2	2.5	2.2	1.6	1.6	1.8	.9	.9	1.2	1.25
11	1.5	1.5	2.1	2.4	2.2	1.7	1.1	1.45	.9	.95	1.1	1.2
12	1.45	1.5	2.2	2.4	2.2	1.6	1.6	1.3	.9	.95	1.1	1.2
13	1.4	1.35	2.2	2.3	2.1	1.6	1.6	1.25	.8	.9	1.25	1.1
14	1.35	1.4	2.2	2.3	2.0	2.4	1.1	1.2	.85	1.4	1.3	1.1
15	1.2	4.2	5.8	2.9	2.0	2.8	1.8	1.3	1.3	1.25	1.2	1.1
16	1.3	3.2	3.8	3.0	2.0	2.3	1.8	1.2	1.25	1.1	1.1	1.05
17	1.3	2.4	3.2	2.8	1.9	2.2	1.8	1.2	1.1	1.0	1.0	1.05
18	1.3	2.3	2.8	2.5	1.9	1.6	2.0	1.2	1.4	.95	.9	1.1
19	1.45	2.2	2.6	2.2	1.8	1.4	1.6	1.25	1.3	2.6	.9	1.2
20	1.3	2.0	2.5	2.2	1.8	1.7	2.0	1.2	.9	1.9	.9	1.1
21	1.3	3.0	2.4	2.2	1.8	1.6	1.9	1.1	.9	1.5	.9	1.05
22	1.2	2.9	2.3	3.7	1.8	1.6	1.8	2.0	2.1	1.4	.9	1.05
23	1.15	2.2	2.4	3.2	1.7	1.5	1.7	1.4	5.2	1.2	.9	1.8
24	1.1	2.3	4.6	2.7	1.7	1.8	1.7	1.25	2.0	1.1	.9	1.6
25	1.1	2.7	3.2	2.4	1.7	2.6	1.7	1.2	1.6	1.0	.9	1.3
26	1.1	4.4	2.8	2.3	2.2	2.8	1.6	1.1	1.4	1.0	.9	1.2
27	1.1	3.9	2.6	3.6	2.8	2.5	1.5	1.05	1.4	1.0	.9	1.3
28	1.1	3.1	2.9	3.0	3.0	2.0	1.4	1.05	1.3	.95	.9	1.2
29	3.6	2.6	7.7	3.3	6.2	1.6	1.4	1.05	1.3	.95	.9	1.2
30	3.4	....	4.4	3.1	2.8	1.8	1.4	1.0	1.25	.95	.85	1.5
31	2.3	....	3.6	....	2.3	....	1.3	.95	....	.95	....	1.7

Daily discharge, in second-feet, of Ocoee River at Copper Hill, Tenn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,560	1,110	1,400	2,300	1,720	1,110	975	975	465	545	600	415
2	1,180	975	1,400	2,220	1,560	1,040	910	720	440	490	518	440
3	975	845	1,400	1,960	1,400	975	975	660	440	465	490	415
4	845	780	1,400	1,880	1,480	1,110	845	600	440	720	465	415
5	780	780	1,400	1,720	1,400	1,040	1,260	660	465	600	465	600
6	720	780	1,560	1,640	1,400	975	1,400	600	490	545	490	1,400
7	720	780	1,400	1,720	1,480	1,110	845	600	490	545	975	845
8	780	720	1,330	1,560	1,480	845	975	660	490	490	845	720
9	1,260	690	1,330	1,480	1,400	910	750	690	490	440	660	660
10	845	660	1,260	1,480	1,260	845	845	975	440	440	600	630
11	780	780	1,180	1,400	1,260	910	545	750	440	465	545	600
12	750	780	1,260	1,400	1,260	845	845	660	440	465	545	600
13	720	690	1,260	1,330	1,180	845	845	630	390	440	630	545
14	690	720	1,260	1,330	1,110	1,400	545	600	415	720	660	545
15	600	2,910	4,780	1,800	1,110	1,720	975	660	660	630	600	545
16	660	2,050	2,560	1,880	1,110	1,330	975	600	630	545	545	518
17	660	1,400	2,050	1,720	1,040	1,260	975	600	545	490	490	518
18	660	1,330	1,720	1,480	1,040	845	1,110	600	720	465	440	545
19	750	1,260	1,560	1,260	975	720	845	630	660	1,560	440	600
20	660	1,110	1,480	1,260	975	910	1,110	600	440	1,040	440	545
21	660	1,880	1,400	1,260	975	845	1,040	545	440	780	440	518
22	600	1,800	1,330	2,480	975	845	975	1,110	1,180	720	440	518
23	572	1,260	1,400	2,050	910	780	910	720	3,970	600	440	660
24	545	1,330	3,300	1,640	910	975	910	630	1,110	545	440	845
25	545	1,640	2,050	1,400	910	1,560	910	600	845	490	440	660
26	545	3,100	1,720	1,330	1,260	1,720	845	545	720	490	440	600
27	545	2,640	1,560	2,390	1,720	1,480	780	518	720	490	440	660
28	545	1,960	1,800	1,880	1,880	1,110	720	518	660	465	440	600
29	2,390	1,560	8,100	2,140	5,390	845	720	518	660	465	440	600
30	2,220	....	3,100	1,960	1,720	975	720	490	630	465	415	780
31	1,330	....	2,390	....	1,330	....	660	465	....	465	....	910

NOTE.—See "Accuracy" in station description.

Monthly discharge of Ocoee River at Copper Hill, Tenn., for 1912.

[Drainage area, 374 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.[a]
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,390	545	874	2.34	2.70	A.
February	3,100	660	1,320	3.53	3.81	A.
March	8,100	1,180	1,970	5.27	6.08	B.
April	2,480	1,260	1,710	4.57	5.10	A.
May	5,390	910	1,410	3.77	4.35	A.
June	1,720	720	1,060	2.83	3.16	A.
July	1,400	545	895	2.39	2.76	A.
August	1,110	465	649	1.74	2.01	A.
September	3,970	390	698	1.87	2.09	B.
October	1,560	440	583	1.56	1.80	A.
November	975	415	527	1.41	1.57	B.
December	1,400	415	629	1.68	1.94	A.
The year	8,100	390	1,030	2.75	37.37	

[a] See "Accuracy" in station description.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous measurements were made in the Ohio River basin in 1912:

Miscellaneous measurements in Monongahela River basin in 1912.

[By H. P. Drake, an engineer of the West Virginia Development Co.]

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.	Drainage area.	Discharge per square mile.
				Feet.	*Sec.-ft.*	*Sq. miles.*	*Sec.-ft.*
Aug. 24	Cheat River...	Monongahela River.	At highway bridge 3 miles below the confluence of Shavers and Dry forks and 2 miles due north of Parsons, W. Va.	2.93	704	[a] 716	0.98
24	.....do.........	.....do.........	.....do....................	2.93	708	[a] 716	.99
Dec. 20	.....do.........	.....do.........	.....do....................	2.60	454	[a] 716	.63

[a] Determined by West Virginia Development Co.

Miscellaneous measurements on New and Green rivers in 1912.

[By C. T. Bailey.]

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.	Drainage area.	Discharge per square mile.
				Feet.	*Sec.-ft.*	*Sq. miles.*	*Sec.-ft.*
Sept. 23	New River....	Ohio River....	Newbern, Va.............	(a)	3,470	2,390	1.45
June 10	Green River...	.....do.........	Rockport, Ky............	(b)	1,910	6,080	.314
8	.....do.........	.....do.........	Livermore, Ky...........	(c)	2,400	7,260	.331

[a] Water surface 27.66 feet below top of upstream bar of lower chord, 2 feet to right of third vertical from left end of bridge, upstream side.

[b] Water surface 43.9 feet below top of upstream girder of third-floor beam to left of pier under left end of drawspan.

[c] Water surface 35.4 feet below top of third floor beam from right abutment at upstream end.

SUMMARY OF DISCHARGE PER SQUARE MILE.

The following summary of discharge per square mile is given to allow ready comparison of relative rates of run-off from different areas in the Ohio River drainage system. It shows in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage. But the most important fact worth noting is the almost entire lack of uniformity or agreement between any two streams. It indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, for river stations in the Ohio River drainage basin in 1912.

Station.	Drainage area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Sq. mi.													
Allegheny River at Red House, N. Y.	1,640	0.98	0.34	3.37	5.78	1.98	0.30	0.29	0.47	1.54	1.26	1.55	1.84	1.64
Allegheny River at Kittanning, Pa.	9,010	1.45	1.32	4.70	5.05	2.09	.40	.62	.88	1.98	1.72	1.40	1.62	1.94
Kiskiminetas River at Avonmore, Pa.	1.720	1.87	2.55	6.45	2.77	2.31	1.55	2.85	1.55	3.64	1.66	1.24	1.16	2.47
Blacklick Creek at Blacklick, Pa.	386	1.75	2.61	6.69	3.15	2.35	1.78	2.05	1.27	4.45	2.21	1.08	1.61	2.58
Tygart River at Belington, W. Va.	390	3.13	3.13	4.95	2.02	3.21	.77	5.13	.63	.64	.23	.85	1.19	2.16
Tygart River at Fetterman, W. Va.	1,340	3.11	2.96	5.09	1.95	2.52	.68	3.76	.66	.87	.23	.89	1.20	2.00
West Fork River at Enterprise, W. Va.	750	2.21	2.67	4.53	1.52	.67	.22	1.77	.59	.75	.15	.31	.73	1.35
Cheat River near Morgantown, W. Va.	1,380	2.57	4.36	6.89	2.52	2.98	1.09	5.59	1.24	2.13	.73	1.68	1.46	2.77
New River at Radford, Va.	2,720	1.04	1.64	3.32	2.03	2.32	1.10	1.12	.89	.94	.61	.73	.66	1.37
Greenbrier River at Alderson, W. Va.	1,340	1.66	2.62	5.19	2.21	2.99	.37	.78	.16	.30	.19	.57	.78	1.49
Dix River near Burgin, Ky.	416	3.70	3.51	7.09	3.61	2.43	.23	1.24	.42	.20	.06	.26	1.89	2.06
Embarrass River near Oakland, Ill.	535	.65	.82	3.50	2.34	1.31	.26	.19	.14	.04	....	.02	.02	....
Embarrass River at Ste. Marie, Ill.	1,540	.61	.77	2.58	2.01	1.43	.36	.88	.41	.10	....	.11	.07	....
East Branch of White River at Shoals, Ind.	4,900	1.59	1.64	4.49	3.65	2.98	.45	.76	.65	.29	.18	.20	.16	1.42
Skillet Fork River near Wayne City, Ill.	481	1.04	1.77	5.76	3.37	.76	1.42	1.00	.21	.03	....	.10	.02	....
French Broad River at Asheville, N. C.	987	1.87	2.56	4.06	3.03	2.62	2.12	2.42	1.58	1.59	1.18	1.26	1.31	2.13
Tennessee River at Chattanooga, Tenn.	21,400	1.87	2.52	4.02	4.28	2.75	1.34	1.62	1.06	.79	.61	.56	1.11	1.87
South Fork of Holston River at Bluff City, Tenn.	828	1.67	2.25	4.31	3.79	2.43	.92	1.28	.97	.62	.42	.51	.63	1.65
Holston River near Rogersville, Tenn.	3,060	1.30	1.76	3.59	3.46	1.96	.87	1.17	.76	.56	.44	.46	.60	1.41
Little Tennessee River at McGhee, Tenn.	2,470	2.81	3.83	5.95	5.55	3.69	2.26	2.62	1.83	1.52	1.21	1.15	1.91	2.86
Tuckasegee River at Bryson, N. C.	662	2.69	3.34	5.85	4.83	3.53	2.33	2.66	1.86	1.49	1.18	1.11	1.66	2.70
Hiwassee River at Murphy, N. C.	410	2.54	3.46	6.12	3.95	3.00	2.20	3.78	1.48	1.35	1.10	1.08	1.44	2.63
Hiwassee River at Reliance, Tenn.	1,180	2.35	3.44	5.19	4.18	2.84	2.19	2.38	1.33	1.11	1.14	.99	1.36	2.37
Ocoee River at Copper Hill, Tenn.	374	2.34	3.53	5.27	4.57	3.77	2.83	2.39	1.74	1.87	1.56	1.41	1.68	2.75

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 324

SURFACE WATER SUPPLY OF THE UNITED STATES

1912

PART IV. ST. LAWRENCE RIVER BASIN

BY

C. C. COVERT, A. H. HORTON
AND W. G. HOYT

WASHINGTON
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SURFACE WATER SUPPLY OF ST. LAWRENCE RIVER BASIN, 1912.

By C. C. Covert, A. H. Horton, and W. G. Hoyt.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 12 reports presenting results of measurements of flow made on streams in the United States during the calendar year 1912.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394) which contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting financially in collecting the data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected and of the second kind on page 14.

Measurements of stream flow have been made at about 2,000 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian

Islands. During 1912 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular water supply papers from time to time.

PUBLICATIONS.

A report for each calendar year has been prepared embodying the stream-flow data collected during that year. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119. Circulars are also available giving complete lists of the gaging stations maintained by the Survey to date, and a list of the reports relating to the water supply of the country.

Prior to 1902 gage heights and discharge measurements were published in water-supply papers of bulletins and estimates of monthly discharge in annual reports; since 1902 both classes of data have been published in water-supply papers, and they are now being published in 12 parts, as shown in the following table:

Papers on surface water supply of the United States, 1912.

Part.[a]	No.	Title.
I	321	North Atlantic coast basins.
II	322	South Atlantic coast and eastern Gulf of Mexico basins.
III	323	Ohio River basin.
IV	324	St. Lawrence River basin.
V	325	Upper Mississippi River and Hudson Bay basins.
VI	326	Missouri River basin.
VII	327	Lower Mississippi River basin
VIII	328	Western Gulf of Mexico basins.
IX	329	Colorado River basin.
X	330	Great Basin.
XI	331	Pacific coast basins in California.
XII	332	North Pacific coast basins.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

A list of reports containing stream-flow data is presented in the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th, A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	....do	1903.
WS 124 to 135	....do	1904.
WS 165 to 178	....do	1905.
WS 201 to 214	Complete data, except descriptions	1906.
WS 241 to 252	Complete data	1907–8.
WS 261 to 272	....do	1909.
WS 281 to 292	....do	1910.
WS 301 to 312	....do	1911.
WS 321 to 332	....do	1912.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1912. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for any station in the area covered by Part I are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, and 321, which contain records for the New England streams from 1903 to 1912. The year covered by the report is indicated at the head of the column in which the paper is listed.

Numbers of water-supply papers containing results of stream measurements, 1899–1912.

	1899 [a]	1900 [b]	1901	1902	1903	1904	1905	1906	1907–8	1909	1910	1911	1912
North Atlantic coast (St. John River to York River)	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126	[d] 165, [e] 166, [f] 167	[d] 201, [e] 202, [f] 203	241	261	281	301	321
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g] 35, 36	48	65, 75	[g] 82, 83	[g] 97, 98	[f] 126, 127	[f] 167, 168	[f] 203, 204	242	262	282	302	322
Ohio River basin	36	48, [h] 49	65, 75	83	98	128	169	205	243	263	283	303	323
St. Lawrence River and Great Lakes	36	49	65, 75	[i] 82, 83	97	129	170	206	244	264	284	304	324
Hudson Bay and upper Mississippi River	36	49	[j] 65, 66, 75	[j] 83, 85	[j] 98, 99, [k] 100	[j] 128, 130	171	207	245	265	285	305	325
Missouri River	[l] 36, 37	49, [m] 50	66, 75	84	[k] 99	130, [n] 131	172	208	246	266	286	306	326
Lower Mississippi River	37	50	[j] 65, 66, 75	[j] 83, 84	[j] 98, 99	[j] 128, 131	[j] 169, 173	[j] 205, 209	247	267	287	307	327
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248	268	288	308	328
Colorado River	[o] 37, 38	50	66, 75	85	100	133	175, [p] 177	211	249	269	289	309	329
Great Basin	38, [q] 39	51	66, 75	85	100	133, [r] 134	176, [r] 177	212, [r] 213	250, [r] 251	270, [r] 271	290	310	330
Pacific coast in California	38, [s] 39	51	66, 75	85	100	134	177	213	251	271	291	311	331
North Pacific coast	38	51	66, 75	85	100	135	[t] 177, 178	214	252	272	292	312	332

[a] Rating tables and index to Water-Suply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, part 4.

[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Estimates for 1900 in Twenty-second Annual Report, part 4.

[c] Wissahickon and Schuylkill Rivers to James River.

[d] New England rivers only.

[e] Hudson River to Delaware River, inclusive.

[f] Susquehanna River to Yadkin River, inclusive.

[g] James River only.

[h] Scioto River.

[i] Lake Ontario and tributaries to St. Lawrence River proper.

[j] Tributaries of Mississippi from east.

[k] Hudson Bay only.

[l] Gallatin River.

[m] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[n] Platte and Kansas rivers.

[o] Green and Gunnison rivers and Grand River above junction with Gunnison.

[p] Below junction with Gila.

[q] Mohave River only.

[r] Great Basin in California, excepting Truckee and Carson drainage basins.

[s] Kings and Kern rivers and south Pacific coast drainage basins.

[t] Rogue, Umpqua, and Siletz rivers only.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.
2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.
3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.
4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Newport, Ky., Federal Building.
St. Paul, Minn., Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 302 Chamber of Commerce Building.
Salt Lake City, Utah, Federal Building.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
Tacoma, Wash., Federal Building.
San Francisco, Cal., 505 Custom House.
Los Angeles, Cal., Federal Building.
Sante Fe, N. Mex., Capitol Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications will be sent on application to the Director of the United States Geological Survey, Washington, D. C.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile; and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off, depth in inches," is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge in second-feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1..........	0.03719	1.041	1.079	1.116	1.153
2..........	.07438	2.083	2.157	2.231	2.306
3..........	.11157	3.124	3.236	3.347	3.459
4..........	.14876	4.165	4.314	4.463	4.612
5..........	.18595	5.207	5.393	5.578	5.764
6..........	.22314	6.248	6.471	6.694	6.917
7..........	.26033	7.289	7.550	7.810	8.070
8..........	.29752	8.331	8.628	8.926	9.223
9..........	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge in second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1..........	1.983	55.54	57.52	59.50	61.49
2..........	3.967	111.1	115.0	119.0	123.0
3..........	5.950	166.6	172.6	178.5	184.5
4..........	7.934	222.1	230.1	238.0	246.0
5..........	9.917	277.7	287.6	297.5	307.4
6..........	11.90	333.2	345.1	357.0	368.9
7..........	13.88	388.8	402.6	416.5	430.4
8..........	15.87	444.3	460.2	476.0	491.9
9..........	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day equals 86,400 cubic feet.
1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-feet.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ =net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

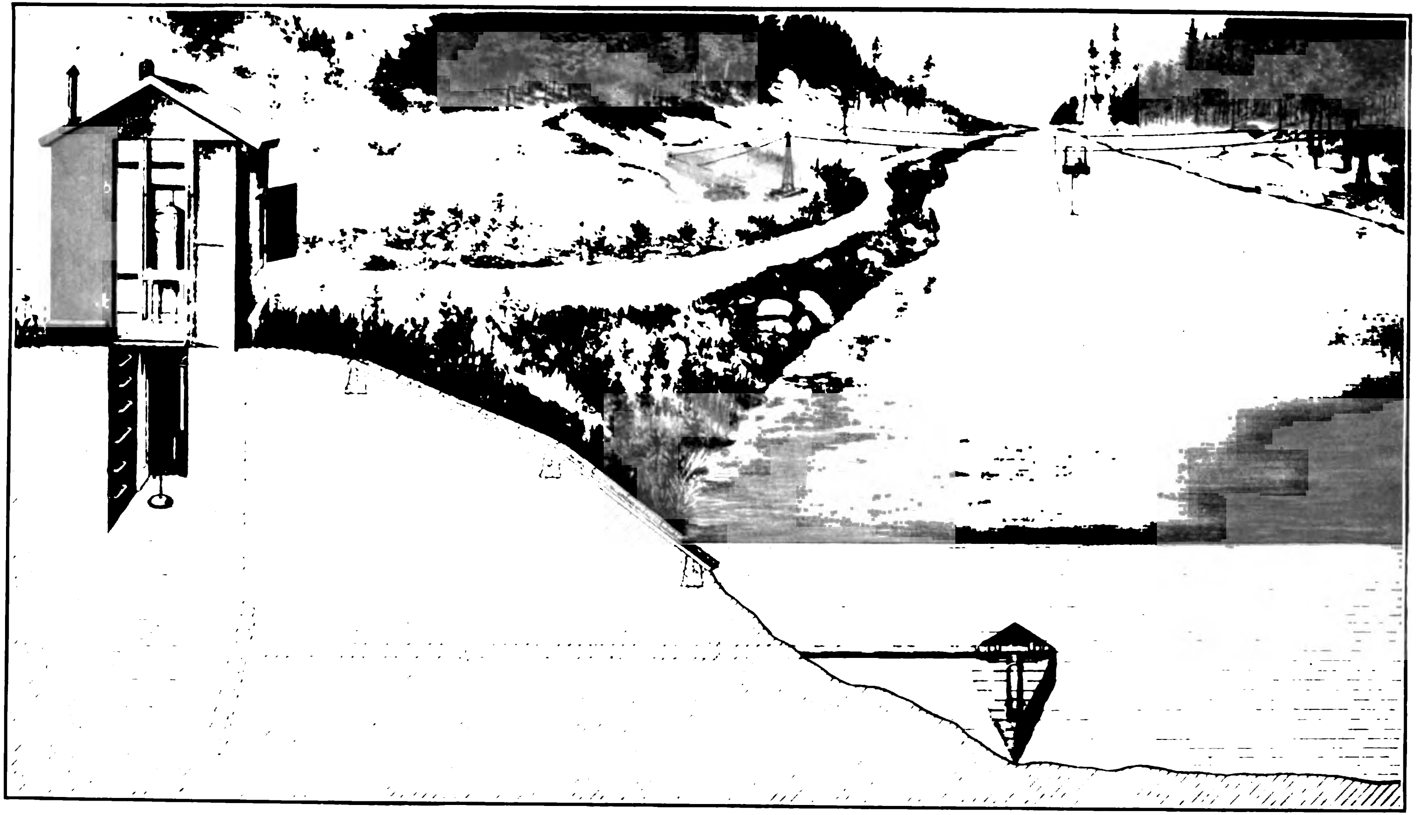
The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge by plotting gage heights in feet as ordinates and discharge in second-feet as abscissas.

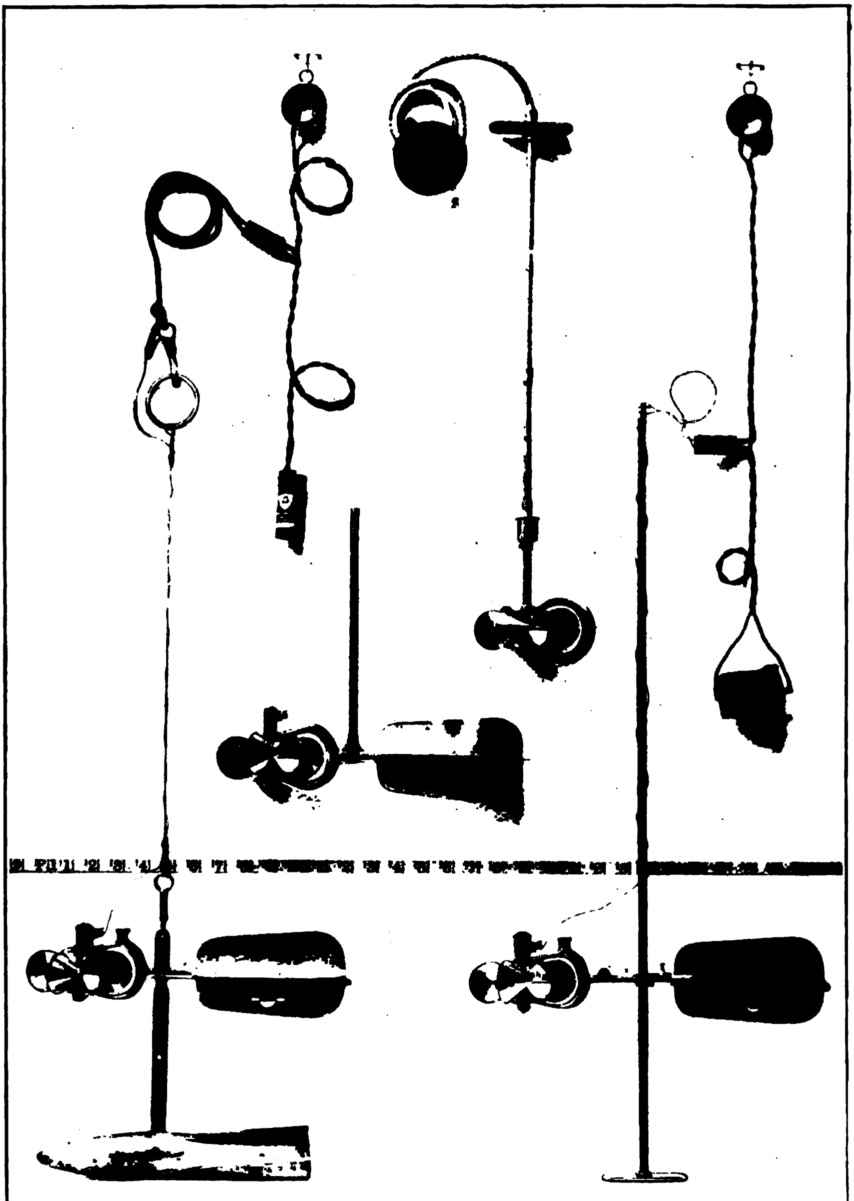
The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on pages 9–10, are based.

The base data presented in this report, unless otherwise stated in description of station, have been collected by the methods commonly



TYPICAL GAGING STATIONS.



PRICE CURRENT METERS.

used at current-meter gaging stations and described in standard textbooks.

Plate I shows typical gaging stations. Plate II shows the current meters used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate" within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the Survey engineers are published, not only to comply with the law, but also to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION.

The work in Minnesota during 1912 has been done with State cooperation under terms of an act of the legislature of 1909 as embodied in joint resolution 19, which reads as follows:

> Whereas the water supplies, water powers, navigation of our rivers, drainage of our lands, and the sanitary condition of our streams and their watersheds generally form one great asset and present one great problem, therefore: *Be it resolved by the house of representatives, the senate concurring,* That the State Drainage Commission be, and is hereby, directed to investigate progress in other States toward the solution of said problem in such States, to investigate and determine the nature of soil problem in this State.

The work has been carried on in conjunction with the State Drainage Commission, George A. Ralph, chief engineer.

Assistance has been rendered by the Oliver Iron Mining Co., who paid salary of observer on Menominee River near Iron Mountain, and to H. G. Roby, resident engineer of the Peninsular Power Co., for assistance and information.

The gaging stations on the Wolf River in the Menominee Indian Reservation were maintained in cooperation with the Office of Indian Affairs, under an allotment made available January 1, 1912.

Cooperation with the State Water Supply Commission of New York was made possible by the provisions of the Fuller bill, chapter 569, laws of 1907, and carried on under agreements between the State Water Supply Commission and the United States Geological Survey. New York State cooperation, under the direction of the State engineer and surveyor, has been carried on under agreements authorized by an act of the State legislature, being paragraph 11 of chapter 420, laws of 1900.

Special acknowledgment is also due to the board of water commissioners, Auburn, N. Y., J. Walter Ackerman, chairman.

The work in Vermont during 1912 has been done in cooperation with the State of Vermont, Allen M. Fletcher, governor.

DIVISION OF WORK.

The field data in the Lake Superior and part of Lake Michigan drainage basins were collected under the direction of W. G. Hoyt, district engineer, by S. B. Soulé.

The field data in the Lake Michigan, Lake Huron, and Lake Erie drainage basins were collected under the direction of A. H. Horton, by P. S. Monk.

The field data in the St. Lawrence drainage basin in New York and Vermont were collected under the direction of C. C. Covert, by O. W. Hartwell, G. H. Canfield, C. S. De Golyer, Frank Weber, J. G. Mathers, and R. S. Barnes.

The ratings, special estimates, and studies of the completed data for stations outside of New York and Vermont were made by A. H. Horton, W. G. Hoyt, H. J. Jackson, and J. G. Mathers.

The computations were made under the direction of H. J. Jackson by H. D. Padgett, C. L. Batchelder, and M. I. Walters.

The ratings, special estimates, and studies of the completed data for stations in New York and Vermont were made by C. C. Covert, O. W. Hartwell, and J. G. Mathers. The computations were made under the direction of O. W. Hartwell, by J. G. Mathers, G. H. Canfield, C. S. De Golyer, Frank Weber, and R. S. Barnes.

The report was edited by Mrs. B. D. Wood.

STREAMS TRIBUTARY TO LAKE SUPERIOR.

POPLAR RIVER AT LUTSEN, MINN.

Location.—About 800 feet above mouth of river in sec. 34, T. 60, R. 3 W.

Records available.—May 6 to November 4, 1911; August 22 to December 31, 1912.

Drainage area.—144 square miles.

Gage.—From May 16 to November 4, 1911, the readings were taken from a staff gage about 400 feet above the mouth of the river. On August 26, 1912, a staff gage was bolted to the rock wall on the right bank about 800 feet above the mouth and in a pool between two distinct falls.

Channel.—The bed at the old site is heavy gravel; that at the new site is solid rock and the control point is the rock crest of the falls below.

Winter flow.—Because of the nature of the control below, ice will probably not cause excessive backwater.

Artificial control.—The flow of the river is controlled to some extent by two dams above the station, the nearest being that of the National Paper & Pulp Co., 2½ miles above the mouth of the river.

Accuracy.—Between May 6 and November 4, 1911, the relation between gage height and discharge at the gage section was at times affected by backwater from deposits of gravel washed up into the mouth of the river during storms on Lake Superior. The present gage is so located that, except for temporary drift lodging on the rapids below, the records should be reliable.

The following discharge measurement was made by S. B. Soulé:

August 22, 1912: Gage height, 1.00 feet; discharge, 25.4 second-feet. Measurement made at wading section about 200 feet below gage. Old gage read 13.07 feet.

Daily gage height, in feet, of Poplar River at Lutsen, Minn., for 1912.

[C. A. A. Nelson, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.08	1.36	1.00		16		1.21	1.19	0.98	
2		1.05	1.31	.98		17		1.22	1.16	.96	
3		1.06	1.26	.98		18		1.31	1.14	.96	
4		1.11	1.22	.98		19		1.26	1.11	.95	
5		1.79	1.20	.98		20		1.26	1.06	.95	
6		2.45	1.20	.98		21		1.38	1.05	.95	0.75
7		2.20	1.08	.98	0.9	22	1.00	1.41	1.04	.95	
8		1.89	1.08	1.00		23	1.00	1.36	1.02	.95	
9		1.72	1.06	1.02		24	.98	1.34	1.02	.95	
10		1.66	1.05	1.02		25	.98	1.38	1.02	.95	
11		1.58	1.05	1.02		26	.98	1.66	1.01	.94	
12		1.49	1.29	1.02		27	1.00	1.65	1.00	.92	
13		1.42	1.26	1.00		28	1.01	1.58	1.00	.92	.7
14		1.32	1.24	1.00	.8	29	1.04	1.51	1.00	.92	
15		1.26	1.21	.99		30	1.06	1.42	1.00	.92	
						31	1.08		1.00		

BEAVER BAY RIVER AT BEAVER BAY, MINN.

Location.—Bridge at Beaver Bay a few hundred yards above the mouth of the river.

Records available.—July 26, 1911, to December 31, 1912.

Gage.—Staff, read from July 26, 1911, to April 9, 1912, when it was washed away. On April 22, a chain gage was fastened to the steel highway bridge. The chain gage is in the same section and is referred to the same datum as the staff gage.

Channel.—Practically permanent; bank high and rocky; bed and control point solid rock.

Winter flow.—Measurements made during the winter season of 1911 and 1912 show that the control point remains open and that the open-water rating curve is applicable throughout the year except at certain times noted under "Accuracy."

Accuracy.—At times of exceptionally high sea on Lake Superior a bar is formed, causing backwater at the gage, which lasts as long as the high sea is running. When the lake becomes normal the water washes through the bar and the regular rating curve applies. This condition has occurred once since the station was established, during the month of December, 1912. Except for such periods the records should be good.

Discharge measurements of Beaver Bay River at Beaver Bay, Minn., in 1912.

Date.		Hydrographer.	Gage height.	Discharge.
			Feet.	*Sec.-feet.*
Jan.	12[a]	S. B. Soulé	0.75	13.1
Mar.	27[a]	do	.66	8.0
	27[a]	do	.66	7.5
	28[a]	do	.66	7.0
	28[a]	do	.65	7.9
Apr.	25[b]	Hoyt and Soulé	2.91	256
Aug.	23[a]	W. G. Hoyt	.85	15.5

[a] Made by wading at various sections above gage.
[b] Made from boat about 750 feet below gage.

Daily gage height, in feet, of Beaver Bay River at Beaver Bay, Minn., for 1911-12.

[Louis Lorntson, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.						
1		3.2	1.6	2.4	1.55	
2		3.1	1.2	2.25	1.45	
3		2.7	1.1	2.3	1.35	
4		2.3	1.6	2.85	1.2	1.25
5		2.05	4.65	2.7	1.2	
6		1.85	4.6	2.55	1.45	
7		3.1	4.2	2.35	1.65	
8		3.4	3.7	2.2	1.65	1.2
9		3.2	3.2	2.1	2.0	
10		3.1	2.95	1.95	2.4	
11		2.95	2.95	1.9	2.25	1.7
12		2.65	2.75	1.85	1.95	
13		2.15	2.45	1.8	2.25	
14		1.9	2.3	1.8	2.25	1.65
15		1.8	2.5	1.75	2.3	
16		1.65	2.3	2.05	2.4	
17		1.5	2.1	2.8		
18		1.45	1.95	2.7		1.48
19		1.35	2.0	2.4		
20		1.25	2.0	2.2	1.7	
21		1.35	2.0	2.0		1.35
22		1.5	2.05	2.0		
23		1.4	2.0	2.0	1.7	
24		1.25	1.9	1.9		
25		1.2	1.8	1.85		
26	1.75	1.1	1.8	1.75		1.25
27	1.4	1.1	1.9	1.75	1.4	
28	1.58	1.05	2.1	1.75		1.2
29	2.05	1.0	2.65	1.6		
30	1.85	1.05	2.6	1.55	1.3	
31	1.8	1.4		1.6		

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.												
1	1.1	0.7		1.58	3.5	2.25	1.05	0.7	2.2	1.9	0.9	
2				1.88	4.0	2.1	1.05	.8	2.0	1.7	.9	
3				2.2	4.4	2.9	1.25	.75	1.7	1.55	1.0	
4	1.1		0.7	3.2	5.0	2.75	1.2	.55	1.8	1.4	1.1	
5		.65		4.8	4.8	2.8	1.1	.65	1.9	1.45	.95	1.05
6					4.4	2.75	1.08	.75	2.0	1.4	1.1	
7			.75		4.0	2.5	.95	.7	2.0	1.35	1.15	
8	.9	.65			4.0	2.2	.85	.8	1.9	1.25	1.1	
9					3.5	2.1	.8	1.3	1.8	1.2	1.1	
10				3.5	4.2	2.0	.7	1.2	1.7	1.25	1.05	
11	.8			3.2	4.8	2.1	.78	1.3	1.45	1.4	1.0	
12			.5	3.5	4.4	2.0	.95	1.2	1.35	1.7	1.0	.52
13				3.0	3.7	2.1	1.0	.88	1.15	1.8	1.25	
14			.5	3.4	3.2	2.1	1.1	.88	1.1	1.72	1.2	
15	.75			3.6	3.2	3.0	.92	.75	1.1	1.62	1.05	
16				3.5	3.0	3.7	.9	.75	1.1	1.58	1.0	
17				3.1	2.8	3.5	.85	1.08	1.2	1.48	1.0	
18	.8		.5	3.0	2.7	2.9	.75	.9	1.2	1.38	.9	
19				2.9	2.6	2.5	.7	.9	1.15	1.28	.8	1.85
20				2.8	2.5	2.3	.6	.78	1.3	1.2	.8	
21			.55	2.9	2.5	2.1	.65	.8	1.35	1.1	.9	
22	.7			2.85	2.5	1.9	.7	.7	1.5	1.1	.8	
23				2.8	2.5	1.7	.8	.65	1.65	.08	1.0	
24				2.8	2.4	1.52	.88	.98	1.55	1.05	.9	
25	.7		.7	2.9	2.4	1.38	.68	.9	1.90	1.0	1.0	
26				5.4	2.4	1.18	.72	1.0	2.6	1.0	1.2	2.05
27				5.4	2.85	1.15	.65	.92	2.45	1.1	.9	
28			.8	4.6	3.1	1.0	.6	1.9	2.2	1.5	1.1	
29	.6	.8		3.7	2.8	1.05	.55	2.1	2.3	1.1	1.0	
30				3.0	2.6	1.2	.3	2.0	1.70	1.1	1.0	
31					3.2		.6	1.9		1.0		

NOTE.—Water over top of gage Apr. 5 to 9, 1912, and gage heights estimated from observer's notes to be about 5.8, 5.4, 5, and 4 feet, respectively, on those days. Staff gage taken out by ice on Apr. 9, 1912, and gage heights Apr. 10 to 21, 1912, determined by measuring down to water surface from a reference point at site of gage. Chain gage installed Apr. 22, 1912. Relation of gage height to discharge during December, 1912, was affected by the formation of a bar and by ice which was thus afforded opportunity to form. See "Accuracy" in station description.

Daily discharge, in second-feet, of Beaver Bay River at Beaver Bay, Minn., for 1911–12.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.													
1	......	370	51	152	48	32	16	......	55	132	94	152	48
2	......	335	29	124	41	32	17	......	44	100	250	130	45
3	......	225	25	132	36	31	18	......	41	82	225	100	43
4	......	132	51	262	29	31	19	......	36	87	152	80	40
5	......	94	940	225	29	30	20	......	31	87	115	59	38
6	......	72	920	188	41	30	21	......	36	87	87	59	36
7	......	335	760	142	55	29	22	......	44	94	87	59	35
8	......	440	560	115	55	29	23	......	38	87	87	59	34
9	......	370	370	100	87	40	24	......	31	77	77	55	33
10	......	335	290	82	152	50	25	......	29	67	72	50	32
11	......	290	290	77	124	59	26	63	25	67	63	45	31
12	......	212	238	72	82	58	27	38	25	77	63	38	30
13	......	108	164	67	124	57	28	50	23	100	63	36	29
14	......	77	132	67	124	55	29	94	21	212	51	34	27
15	......	67	175	63	132	51	30	72	23	200	48	33	26
							31	67	38	......	51	......	25

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1912.											
1	25	9	......	50	480	124	23	12	115	77	18
2	......	......	......	75	680	100	23	15	87	59	18
3	......	......	......	115	840	275	31	14	59	48	21
4	25	......	9	370	1,080	238	29	8	67	38	25
5	......	7	......	1,000	1,000	250	25	10	77	41	20
6	......	......	......	1,400	840	238	24	14	87	38	25
7	......	......	11	1,200	680	175	20	12	87	36	27
8	17	7	......	1,100	680	115	16	15	77	31	25
9	......	......	......	680	480	100	15	33	67	29	25
10	......	......	......	480	760	87	12	29	59	31	23
11	13	......	......	370	1,000	100	14	33	41	38	21
12	......	......	4	480	840	87	20	29	36	59	21
13	......	......	......	305	560	100	21	17	27	67	31
14	......	......	4	440	370	100	25	17	25	61	29
15	11	......	......	520	370	305	19	14	25	53	23
16	......	......	......	480	305	560	18	14	25	50	21
17	......	......	......	335	250	480	16	24	29	43	21
18	13	......	4	305	225	275	14	18	29	27	18
19	......	......	......	275	200	175	12	18	27	32	15
20	......	......	......	250	175	132	9	14	33	29	15
21	......	......	4	275	175	100	10	15	36	25	18
22	9	......	......	262	175	77	12	12	44	25	15
23	......	......	......	250	175	59	15	10	55	24	21
24	......	......	......	250	152	45	17	20	48	23	18
25	9	......	9	275	152	37	11	18	77	21	21
26	......	......	......	1,240	152	28	13	21	200	21	29
27	......	......	......	1,240	262	27	10	19	164	25	18
28	......	......	13	920	335	21	9	77	115	44	25
29	5	13	......	560	250	23	8	100	132	25	21
30	......	......	......	305	200	29	3	87	59	25	21
31	......	......	......	......	370	......	9	77	......	21	......

NOTE.—Daily discharge computed from a rating table well defined between 7 and 132 second-feet (gage heights 0.5 and 2.3 feet), fairly well defined between 152 and 305 second-feet (gage heights 2.4 and 3 feet). Above 305 second-feet (gage height 3 feet) the curve is an extension and above discharge 680 second-feet (gage height 4 feet), is subject to an error of about 10 per cent. Discharge Nov. 17, 1911, to Mar. 31, 1912, computed from semi-weekly gage heights. Ordinarily ice has no effect upon relation of gage height to discharge at this station. Discharge Dec. 1 to 31, 1912, estimated, because of bar and ice, from weekly gage heights, climatologic records, and discharge measurement made Jan. 14, 1913. Mean discharge Dec. 1 to 31, 1912, estimated 10 second-feet, varying from about 6 to 23 second-feet. Daily discharge Apr. 5 to 9, 1912, estimated from observer's notes as to height of water surface above top of gage.

Monthly discharge of Beaver Bay River at Beaver Bay, Minn., for 1911–12.

[Drainage area, 120 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
August	440	21	129	1.08	1.24	A.
September	940	25	218	1.82	2.03	B.
October	262	48	111	.925	1.07	B.
November	152	29	71.6	.597	.67	C.
December	59	25	37.6	.313	.36	B.
1912.						
January			20	.167	.19	B.
February			10	.083	.09	B.
March			7	.058	.07	C.
April	[a]1,400	50	527	4.39	4.90	C.
May	1,080	152	458	3.82	4.40	C.
June	560	21	149	1.24	1.38	B.
July	31	3	16.2	.135	.16	C.
August	100	8	26.3	.219	.25	B.
September	200	25	67	.558	.62	A.
October	77	21	37.9	.316	.36	B.
November	31	15	21.6	.180	.20	B.
December			10	.083	.10	C.
The year	[a]1,400	3	112	.933	12.72	

[a] Estimated.

NOTE.—See footnotes to table of daily discharge.

ST. LOUIS RIVER NEAR THOMSON, MINN.

Location.—Just below the tailrace of the Great Northern power house, 3 miles east of Thomson in sec. 11, T. 48 N., R. 16 W.

Records available.—October 5, 1909, to December 31, 1912.

Drainage area.—3,420 square miles.

Gage.—Chain, read four times each day (except Sunday), at 8 and 11 a. m., 2 and 5 p. m. Average of four readings taken as the mean for the day; datum of gage unchanged.

Channel.—Practically permanent at low stages; at high stages may shift slightly, as shown by the 1912 discharge measurements.

Discharge measurements.—Made from a cable 1,500 feet below the staff gage.

Artificial control.—The flow at the station is to a certain extent regulated by reservoirs above. The dam at Thomson is designed to hold 24 hours' supply of water for the power plant, and logging dams control the discharge from a large part of the entire area above the station. The gage heights show considerable fluctuation caused by the operation of the turbine gates at the power plant, which is operated on a 24-hour schedule, though with varying load.

Winter flow.—Previous to November, 1910, the relation of gage height to discharge at this station was probably not materially affected by ice. During 1911 and 1912 it has been found that the presence of ice renders the gage heights useless as an indication of discharge. During such periods the estimates of flow have been furnished by the Great Northern Power Co., computed from the amount of water passing through their turbines.

Accuracy.—The daily estimates are liable to errors due to fluctuation in the stage caused by the operation of the power house. The daily range in stage is not great, however, and it is believed that errors will compensate for a month, so that the monthly averages should be accurate within 10 per cent. No statement is available relative to the accuracy of the records furnished by the power company.

The discharge measurement made May 17, 1912, indicates that the discharge rating table (based on discharge measurement made Apr. 15, 1911) used to compute the values of daily discharge published in Water-Supply Paper 304, page 20, gave discharges too large above 7,000 second-feet as follows: At 7,000 second-feet, about 4 per cent large; at 8,000 second-feet, about 7 per cent large; at 9,000 second-feet, about 9 per cent large; at 10,000 second-feet, about 11 per cent large; at 11,000 second-feet, about 12 per cent large.

Cooperation.—Gage heights throughout the year and records of flow when ice affects the relation of gage height to discharge are furnished through the courtesy of the Great Northern Power Co., of Duluth.

Discharge measurements of St. Louis River near Thomson, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
May 17	S. B. Soulé	5.67	9,580
June 26	W. G. Hoyt	2.47	2,720
Aug. 9	S. B. Soulé	.46	574

Daily gage height, in feet, of St. Louis River near Thomson, Minn., for 1912.

[Gus Forsell, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.05	4.2	5.3	1.8	1.6		1.2	1.0
2	1.15	3.8	4.4	1.5	1.6		1.4	.95
3	1.35	4.9	4.5	1.3	.50	0.70	1.4	
4	1.6	5.3	4.6	1.5		.60	1.4	.8
5	2.0	6.1	4.3	2.0	.60	.80	1.4	.75
6	2.6	6.7	3.9	1.35	.55	.90		.8
7	2.3	7.0	3.8	1.1	.55	.90	1.35	.8
8	2.3	6.2	3.4	.50	.50	.90	1.3	.75
9	2.4	6.3		1.3	.45	1.2	1.15	.8
10	2.2	5.8	2.6	.85	.55	1.7	1.3	
11	2.3	6.0	2.3	.80		1.8	1.1	.8
12	2.3	5.7	2.9	1.2	.85	1.9	1.1	.75
13		5.6	2.7	1.9	.78	1.9		.85
14		5.1	3.0		.65	1.8	1.15	.75
15	1.9	5.6	2.4	1.05	.55		1.05	
16	1.9	5.3	2.8	2.3	.45	1.8	1.4	.6
17	1.9	5.7	3.9	2.3	.40	1.6	1.1	
18	1.8	5.2	3.9	2.4		1.5	1.05	.6
19	1.6	4.5	3.7	2.1	.50	1.5	1.1	.48
20	1.8	4.8	3.4	2.0	.00	1.45		.15
21		4.5	3.4		.00	1.35	1.7	.24
22	1.9	4.0	3.7	.90	.95		2.3	.24
23	2.4			1.8	.40	.90	2.2	.11
24	1.8		2.9	2.1	.40	.85	1.6	.00
25	1.7	4.0	3.0	1.5		1.1	1.1	.22
26	2.6	3.8	2.6	.90	.10	1.0	.85	
27	3.5	4.3	2.1	.75	.95	.90		.23
28	4.0	5.2	1.9	.02	.50	1.05	.9	.00
29	5.1	5.3	1.6		.60		1.1	.00
30	4.1	5.0	1.6	.50	.60	1.15	1.0	
31		5.0		.50	.60		1.0	

Daily discharge, in second-feet, of St. Louis River near Thomson, Minn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	372	379	387	1,040	5,910	8,630	1,890	1,610	693	1,180	1,000	523
2	379	361	398	1,140	5,050	6,370	1,500	1,610	716	1,390	955	482
3	422	336	403	1,340	7,590	6,600	1,280	600	740	1,390	890	622
4	397	340	407	1,610	8,630	6,840	1,500	635	670	1,390	820	599
5	438	344	407	2,070	10,700	6,140	2,070	670	820	1,390	780	519
6	633	341	382	2,910	12,800	5,260	1,340	635	910	1,360	820	397
7	667	339	393	2,480	13,200	5,050	1,090	635	910	1,340	820	426
8	677	331	382	2,480	11,000	4,250	600	600	910	1,280	780	378
9	848	330	388	2,620	11,300	3,580	1,280	565	1,180	1,140	820	370
10	1,040	330	375	2,340	9,930	2,910	865	635	1,720	1,280	820	390
11	1,330	261	336	2,480	10,400	2,480	820	780	1,830	1,090	820	390
12	936	196	327	2,480	9,670	3,380	1,180	865	1,950	1,090	780	358
13	625	338	343	2,300	9,410	3,060	1,950	804	1,950	1,120	865	246
14	392	326	342	2,120	8,110	3,540	1,500	705	1,830	1.140	780	375
15	340	328	364	1,950	9,410	2,620	1,040	635	1,830	1,040	720	372
16	355	329	384	1,950	8,630	3,220	2,480	565	1,830	1,390	670	385
17	310	320	417	1,950	9,670	5,260	2,480	530	1,610	1,090	670	463
18	309	240	411	1,830	8,370	5,260	2,620	565	1,500	1,040	670	390
19	314	171	399	1,610	6,600	4,840	2,200	600	1,500	1,090	586	406
20	283	346	425	1,830	7,330	4,250	2,070	330	1,440	1,400	392	423
21	343	333	418	1,890	6,600	4,250	1,490	330	1,340	1,720	437	406
22	327	349	439	1,950	5,470	4,840	910	955	1,120	2,480	437	428
23	382	368	447	2,620	5,470	4,110	1,830	530	910	2,340	374	395
24	425	401	471	1,830	5,470	3,380	2,200	530	865	1,610	330	401
25	423	402	442	1,720	5,470	3,540	1,500	450	1,090	1,090	426	426
26	401	394	452	2,910	5,050	2,910	910	370	1,000	865	429	428
27	384	386	465	4,440	6,140	2,200	780	955	910	880	432	342
28	386	378	553	5,470	8,370	1,950	338	600	1,040	910	330	360
29	387	385	656	8,110	8,630	1,610	469	670	1,090	1,090	330	331
30	388	....	675	5,690	7,850	1,610	600	670	1,140	1.000	330	361
31	384	....	724	....	7,850	....	600	670	....	1,000	....	310

NOTE.—Daily discharge computed from a rating curve well defined between 530 and 10,400 second-feet (gage heights 0.4 and 6 feet). Discharge Jan. 1 to Mar. 30, and Dec. 1 to 31, estimated, because of ice, from kilowatt output at Great Northern Power plant plus water passing over dam. Table as published for this period furnished by Great Northern Power Co., of Duluth. Discharge interpolated for days when gage was not read.

Monthly discharge of St. Louis River near Thomson, Minn., for 1912.

[Drainage area, 3,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,330	283	493	0.144	0.17	
February	402	171	334	.098	.11	
March	724	327	433	.127	.15	
April	8,110	1,040	2,570	.751	.84	C.
May	13,200	5,050	8,240	2.41	2.78	B.
June	8,630	1,610	4,130	1.21	1.35	B.
July	2,620	338	1,400	.409	.47	B.
August	1,610	330	687	.201	.23	B.
September	1,950	670	1,230	.360	.40	B.
October	2,480	865	1,280	.374	.43	B.
November	1,000	330	644	.188	.21	C.
December	622	246	410	.120	.14	
The year	13,200	171	1,830	.535	7.28	

NOTE.—See footnotes to table of daily discharge.

WHITEFACE RIVER AT MEADOWLANDS, MINN.

Location.—At the highway bridge at Meadowlands, in sec. 14, T. 53 N., R. 19 W., half a mile below the nearest tributary, a small stream entering from the east.

Records available.—June 7, 1909, to December 31, 1912.

Drainage area.—442 square miles.

Gage.—Vertical staff; datum unchanged since establishment.

Channel.—Shifting at bridge, nearly permanent at control section.

Discharge measurements.—Made from highway bridge except during extremely low water, when wading measurements are made.

Regulation.—The flow is controlled to a large extent by logging dams above. The opening and shutting of the gates of these dams causes fluctuations in gage heights of several feet at the gaging station.

Accuracy.—Logs collect on the control section some 2 miles below the gage, causing a varying amount of backwater at the gage. Prior to 1912 the flow during such periods of the year has been computed from a number of rating curves, some of which have been applied indirectly. During 1912 the flow during periods of backwater has been computed, using gage height at a chain gage established below the rapids applied to a rating curve which has been developed for that point.

Discharge measurements of Whiteface River at Meadowlands, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*			*Feet.*	*Sec.-feet.*
Apr. 24	S. B. Soulé	4.24	163	Aug. 11[c]	S. B. Soulé	3.51	44
May 18[a]	.....do	7.10	966	11[d]	.....do	3.50	45
Aug. 11[b]	.....do	3.52	38				

[a] Lower gage 4.17.
[b] Lower gage 1.80. Current very sluggish.
[c] Lower gage 1.80.
[d] Lower gage 1.79.

Daily gage height, in feet, of Whiteface River at Meadowlands, Minn., for 1912.

[A. F. Johnson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		6.0	6.2	4.2	3.5	3.8	4.2	3.5
2		6.0	6.8	4.1	3.5	3.8	4.1	3.5
3		8.7	6.6	4.0	3.4	3.8	4.1	3.5
4		9.2	6.3	4.0	3.4	3.8	4.0	3.5
5		9.3	6.0	4.0	3.4	3.8	4.0	3.5
6		9.0	5.9	3.8	3.4	3.8	4.0	3.5
7		9.1	5.8	3.7	3.4	3.8	3.9	3.5
8		8.7	5.8	3.6	3.4	3.8	3.8	3.5
9		7.9	5.6	3.6	3.4	3.8	3.8	3.5
10	4.7	7.2	5.5	3.6	3.5	3.8	3.8	
11	4.8	7.4	5.4	3.8	3.5	3.8	3.8	
12	4.7	7.9	5.3	3.8	3.5	3.8	3.8	
13	4.6	6.9	5.2	3.7	3.5	3.8	3.8	
14	5.0	7.8	5.6	3.8	3.5	3.7	3.75	
15	5.3	7.2	6.3	3.8	3.5	3.7	3.7	
16	4.85	7.8	7.1	3.8	3.45	3.7	3.6	
17	4.5	6.9	7.6	3.8	3.45	3.7	3.65	
18	4.4	6.8	7.7	3.8	3.4	3.7	3.65	
19	4.25	7.2	7.3	3.8	3.4	3.7	3.6	
20	4.3	6.9	7.0	3.8	3.4	3.7	3.6	
21	4.4	7.2	6.4	3.8	3.45	3.7	3.6	
22	4.3	7.7	6.0	3.8	3.45	3.7	3.6	
23	4.6	7.3	5.7	3.7	3.45	3.7	3.6	
24	4.25	7.3	5.5	3.6	3.5	3.7	3.6	
25	4.6	6.5	5.4	3.6	3.65	3.7	3.55	
26	5.2	6.5	5.2	3.6	3.8	3.8	3.55	
27	6.4	7.5	4.8	3.6	3.6	3.8	3.5	
28	7.0	7.6	4.6	3.6	3.65	4.1	3.5	
29	7.4	8.1	4.4	3.5	3.7	4.4	3.5	
30	7.0	7.5	4.2	3.5	3.8	4.3	3.5	
31		6.5		3.5	3.8		3.5	

NOTE.—Relation of gage height to discharge affected by backwater from log jams about Apr. 27 to May 9, 11, 12, 14 to 17, and 19 to 31.

Daily discharge, in second-feet, of Whiteface River at Meadowlands, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	....	660	151	50	90	151	50
2	....	....	870	135	50	90	135	50
3	....	....	800	120	40	90	135	50
4	....	....	695	120	40	90	120	50
5	....	....	590	120	40	90	120	50
6	....	....	560	90	40	90	120	50
7	....	....	530	76	40	90	105	50
8	....	....	530	62	40	90	90	50
9	....	....	470	62	40	90	90	50
10	247	1,020	440	62	50	90	90	....
11	269	1,020	415	90	50	90	90	....
12	247	1,020	390	90	50	90	90	....
13	227	905	365	76	50	90	90	....
14	315	....	470	90	50	76	83	....
15	390	....	695	90	50	76	76	....
16	280	....	980	90	45	76	62	....
17	207	....	1,180	90	45	76	69	....
18	187	870	1,220	90	40	76	69	....
19	160	....	1,060	90	40	76	62	....
20	169	....	940	90	40	76	62	....
21	187	....	730	90	45	76	62	....
22	169	....	590	90	45	76	62	....
23	227	....	500	76	45	76	62	....
24	160	....	440	62	50	76	62	....
25	227	....	415	62	69	76	56	....
26	365	....	365	62	90	90	56	....
27	380	....	269	62	62	90	50	....
28	420	....	227	62	69	135	50	....
29	460	....	187	50	76	187	50	....
30	500	....	151	50	90	169	50	....
31	....	....	....	50	90	....	50	....

NOTE.—Discharge Apr. 27 to May 9, May 11, 12, 14 to 17 and 19 to 31 estimated because of log jams from flow of Whiteface River below Meadowlands, Minn.
Mean discharge May 1 to 9 estimated 920 second-feet.
Mean discharge May 14 to 17 estimated 760 second-feet.
Mean discharge May 19 to 31 estimated 820 second-feet.
Backwater from ice probably began about Nov. 18.

Monthly discharge of Whiteface River at Meadowlands, Minn., for 1912.

[Drainage area, 442 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
April 10–30	[a] 500	160	276	0.624	0.49	B.
May	....	....	865	1.96	2.26	B.
June	1,220	151	591	1.34	1.50	A.
July	151	50	83.9	.190	.22	B.
August	90	40	52.3	.118	.14	C.
September	187	76	91.8	.208	.23	B.
October	151	50	81.3	.184	.21	B.
November 1–9	50	50	50	.113	.04	C.

[a] Estimated.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

WHITEFACE RIVER BELOW MEADOWLANDS, MINN.

Location.—About 2½ miles below the gaging station on Whiteface River at Meadowlands, half a mile below the beginning of decided rapids and about 10 miles above the confluence of Whiteface and St. Louis rivers.

Records available.—April 28 to November 18, 1912.

Drainage area.—446 square miles.

Channel.—Heavy gravel and rocks; probably permanent.

Discharge measurements.—Made by wading and from the highway bridge in sec. 14, T. 83 N., R. 19 W., at which is located the gage of the station on Whiteface River at Meadowlands.

Regulation.—The flow is controlled to a large extent by logging dams above. The operation of these gates causes fluctuation in gage heights of several feet at the gage section.

Accuracy.—The channel is permanent and few logs lodge below the section, so that backwater is seldom present except from ice. Measurements made during 1913 show that the 1912 curve is reliable. The records should therefore be good.

Daily gage height, in feet, of Whiteface River below Meadowlands, Minn., for 1912.

[A. A. Jochim, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3.65	4.05	2.5	1.75	2.2	2.6	1.81
2		3.25	4.4	2.45	1.71	2.25	2.55	1.74
3		3.45	4.3	2.4	1.69	2.2	2.45	1.72
4		4.5	4.1	2.35	1.65	2.2	2.4	1.82
5		5.1	4.0	2.3	1.65	2.15	2.35	1.72
6		5.2	4.0	2.25	1.72	2.3	2.3	1.80
7		5.2	3.9	2.2	1.75	2.5	2.2	1.80
8		5.2	3.75	2.2	1.70	2.55	2.25	1.80
9		5.0	3.4	2.2	1.74	2.55	2.15	1.80
10		4.8	3.45	2.1	1.81	2.45	2.1	1.80
11		4.8	3.35	2.0	1.81	2.3	2.1	1.80
12		4.8	3.35	2.05	1.79	2.2	2.05	1.81
13		4.6	3.3	2.15	1.78	2.2	2.1	1.81
14		4.3	3.35	2.35	1.72	2.1	2.05	1.78
15		4.4	3.6	2.4	1.71	2.1	2.05	1.66
16		4.7	5.0	2.4	1.71	2.1	2.0	1.72
17		3.75	5.2	2.4	1.81	2.05	2.0	1.70
18		4.7	5.1	2.3	1.79	2.05	2.1	1.71
19		4.4	5.0	2.2	1.79	2.05	1.98	
20		4.3	4.7	2.1	1.80	1.96	1.98	
21		4.0	4.3	2.0	1.76	2.05	1.95	
22		4.1	4.0	1.94	1.70	2.05	1.92	
23		4.2	3.7	1.98	1.71	2.0	1.89	
24		4.1	3.45	2.0	1.71	1.96	1.89	
25		3.95	3.25	1.96	1.70	2.05	1.85	
26		3.35	3.15	1.91	1.72	2.1	1.84	
27		4.8	2.9	1.84	1.78	2.2	1.82	
28	3.2	5.4	2.8	1.82	1.81	2.35	1.82	
29	3.45	5.1	2.6	1.88	1.85	2.5	1.82	
30	3.6	4.8	2.5	1.76	2.0	2.6	1.82	
31		4.4		1.68	2.1		1.82	

Daily discharge, in second-feet, of Whiteface River below Meadowlands, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	489	620	142	42	86	166	46
2	....	356	802	131	40	94	154	42
3	....	421	752	120	40	86	131	41
4	....	854	662	111	38	86	120	46
5	....	1,200	620	102	38	79	111	41
6	....	1,260	620	94	41	102	102	45
7	....	1,260	580	86	42	142	86	45
8	....	1,260	524	86	40	154	94	45
9	....	1,140	404	86	42	154	79	45
10	....	1,020	421	72	46	131	72	45
11	....	1,020	388	60	46	102	72	45
12	....	1,020	388	66	44	86	66	46
13	....	906	372	79	44	86	72	46
14	....	752	388	111	41	72	66	44
15	....	802	472	120	40	72	66	38
16	....	960	1,140	120	40	72	60	41
17	....	524	1,260	120	46	66	60	41
18	....	960	1,200	102	44	66	72	40
19	....	802	1,140	86	44	66	58	....
20	....	752	960	72	45	56	58	....
21	....	620	752	60	43	66	56	....
22	....	662	620	55	40	66	53	....
23	....	706	506	58	40	60	50	....
24	....	662	421	60	40	56	50	....
25	....	600	356	56	40	66	48	....
26	....	388	325	52	41	72	47	....
27	....	1,020	250	47	44	86	46	....
28	340	1,390	220	46	46	111	46	....
29	421	1,200	166	50	48	142	46	....
30	472	1,020	142	43	60	166	46	....
31	....	802	....	39	72	....	46	....

NOTE.—Daily discharge computed from a fairly well defined rating curve which was determined from a gage height comparison with gage at Meadowlands in conjunction with discharge measurements made May 18 and Aug. 11, 1912.

Monthly discharge of Whiteface River below Meadowlands, Minn., for 1912.

[Drainage area, 446 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May	1,390	356	865	1.94	2.24	A.
June	1,260	142	582	1.30	1.45	B.
July	142	39	81.7	.183	.21	B.
August	72	38	43.8	.098	.11	B.
September	166	56	91.6	.205	.23	B.
October	166	46	74.2	.16	.19	B.
November 1-18	46	38	43.4	.097	.06	B.

CLOQUET RIVER AT INDEPENDENCE, MINN.

Location.—At the highway bridge at Independence post office in sec. 26, T. 52 N., R. 17 W., just below a small tributary entering from the north.

Records available.—June 28, 1909, to December 31, 1912.

Drainage area.—698 square miles.

Gage.—Vertical staff; datum unchanged since establishment.

Channel.—Practically permanent except when affected by log jams.

Discharge measurements.—Made from bridge.

Winter flow.—Affected by ice. See footnote to table of daily discharge.

Artificial control.—Cloquet River is used extensively for log driving, and the run-off from by far the greater part of the drainage area above Independence is controlled by logging dams. This control causes violent fluctuations in the gage heights during the day, amounting at times to several feet, and consequently the mean daily gage height which is the mean of three readings taken morning, noon, and night, can be considered only approximate. The chief purpose of the records is to show the approximate mean monthly discharge and total discharge.

Accuracy.—The wing dam of logs which was placed in the river below the gage in 1911 was removed June 5, 1912. Measurements made after June 5, 1912, indicate that conditions have changed slightly from what they were before the dam was installed. The winter records are very good. For open-water accuracy see note under "artificial control."

Cooperation.—Records of flow from the logging reservoirs were furnished by the Great Northern Power Co. of Duluth for the periods January 1–March 31, and December 1–31, 1912.

Discharge measurements of Cloquet River at Independence, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 14[a]	S. B. Soulé	6.17	87.8
Feb. 24[b]	....do	7.03	180
Mar. 29[c]	....do	7.42	267
May 18	....do	6.55	946
Aug. 10[d]	....do	4.84	264
Sept. 29[e]	....do	3.96	71.1
29[f]	....do	3.96	62.0

[a] Complete ice cover. Average thickness of ice 1.95 feet. Average distance water surface to top of ice, 0.28 feet.

[b] Complete ice cover. Average thickness of ice 3.08 feet. Average distance water surface to top of ice, 0.31 feet.

[c] Complete ice cover. Average thickness of ice 3.09 feet. Average distance water surface to top of ice, 0.16 feet.

[d] Wing dam of logs has been removed.

[e] Wading, 1,100 feet above gage.

[f] Wading, 1,300 feet above gage.

Daily gage height, in feet, of Cloquet River at Independence, Minn., for 1912.

[Herbert Haakensen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	4.75	....	....	7.1	5.3	7.4	4.85	3.86	4.6	4.1	4.8
2	....	....	....	....	7.3	7.9	4.55	4.45	4.5	4.55	4.65
3	....	....	....	....	6.7	8.3	5.9	5.1	4.45	4.8	4.7
4	6.2	....	7.25	7.1	5.85	8.2	6.2	5.2	4.5	5.0	4.7
5	....	....	....	....	7.3	7.6	4.85	5.1	4.45	5.05	4.7
6	....	....	....	....	8.2	7.3	4.65	5.0	4.4	5.15	4.7
7	....	....	7.15	....	7.3	7.2	5.7	5.25	4.5	5.2	4.8
8	5.3	....	....	7.0	8.0	6.3	5.05	5.15	4.6	5.0	4.8
9	....	....	....	....	7.8	5.25	4.75	5.3	4.65	4.95	4.75
10	....	....	....	....	7.6	4.6	5.3	4.85	4.7	4.9	4.55
11	5.35	....	7.2	5.55	7.2	6.7	6.5	4.75	4.95	4.85	4.35
12	....	....	....	....	7.5	6.5	6.1	4.7	4.95	4.8	4.45
13	....	....	....	....	6.4	6.9	4.75	4.65	5.0	4.75	4.3
14	6.2	....	7.4	4.3	7.2	5.25	5.85	4.7	4.9	4.7	4.2
15	5.8	....	....	4.3	7.5	4.65	7.6	4.45	4.75	4.7	4.15
16	....	....	....	4.3	7.9	4.6	7.8	4.65	4.65	4.6	3.91
17	....	....	....	4.2	8.3	4.65	7.7	4.85	4.85	4.7	4.1
18	6.1	....	7.45	4.3	6.6	4.6	6.8	4.8	4.8	4.65	4.0
19	....	....	....	4.7	7.0	4.5	6.6	4.55	4.65	4.6	4.15
20	....	....	....	4.7	7.2	5.1	4.75	4.6	4.8	6.15	4.1
21	....	....	7.5	6.2	5.25	5.7	4.3	4.4	4.75	6.7	4.05
22	6.4	....	....	6.0	5.7	6.1	7.2	4.3	4.7	6.6	4.65
23	....	....	....	4.95	5.9	5.6	6.2	4.3	4.7	6.4	4.6
24	....	7.0	....	4.85	5.7	6.0	5.7	4.15	4.7	6.0	4.75
25	6.5	....	7.4	6.1	6.8	5.7	5.2	4.1	4.8	6.0	5.0
26	....	7.15	....	6.2	7.6	5.2	4.6	4.05	4.8	5.9	4.95
27	....	....	....	6.0	6.3	4.7	4.35	4.0	4.9	5.5	5.0
28	....	....	7.45	6.8	7.3	4.8	4.05	4.0	4.9	5.45	5.0
29	....	7.25	7.4	6.2	7.1	5.25	3.89	4.45	4.35	5.1	5.0
30	....	....	....	7.0	8.3	4.8	3.84	4.45	4.05	4.9	5.0
31	....	....	....	....	8.3	....	3.80	4.55	....	4.8	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Apr. 13, and Nov. 22 to Dec. 31.

Daily discharge, in second-feet, of Cloquet River at Independence, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		317	1,530	274	60	193	85	257
2		1,450	1,930	179	152	165	179	208
3		1,000	2,250	845	370	152	257	224
4		524	2,170	1,080	415	165	330	224
5		1,450	1,690	274	370	152	350	224
6		2,170	2,390	208	330	140	392	224
7		1,450	2,250	700	440	165	415	257
8		2,010	1,180	350	392	193	330	257
9		1,850	440	240	465	208	311	240
10		1,690	193	465	274	224	292	179
11		1,370	1,600	1,370	240	311	274	129
12		1,610	1,370	1,000	224	311	257	152
13		800	1,850	240	208	330	240	118
14	90	1,370	440	808	224	292	224	100
15	90	1,610	208	2,820	152	240	224	92
16	90	1,930	193	3,120	208	208	193	64
17	78	2,250	208	2,970	274	274	224	85
18	90	930	193	1,720	257	257	208	73
19	158	1,220	165	1,480	179	208	193	92
20	158	1,370	370	240	193	257	1,040	85
21	685	302	700	118	140	240	1,600	79
22	590	461	1,000	2,250	118	224	1,480	
23	217	545	635	1,080	118	224	1,270	
24	192	461	920	700	92	224	920	
25	635	1,070	700	415	85	257	920	
26	685	1,690	415	193	79	257	845	
27	590	740	224	129	73	292	575	
28	1,070	1,450	257	79	73	292	548	
29	685	1,300	440	62	152	129	370	
30	1,220	2,250	257	58	152	79	292	
31		2,250		55	179		257	

NOTE.—Daily discharge computed from two rating tables well defined between 60 and 2,000 second-feet. On June 5, 1912, the wing dam below the bridge was entirely removed. One rating table applies prior to this date, and the other subsequent to it.

Discharge Jan. 1 to Apr. 13 and Nov. 22 to Dec. 31 estimated, because of ice, from discharge measurements and records of daily flow (Jan 1 to Mar 31 and Dec. 1 to 31), at outlet of Fish Lake reservoir. sec. 29, T. 52 N., R. 15 W., and Island Lake reservoir, sec. 15, T. 52 N., R. 15 W., furnished by Great Northern Power Co.

Mean discharge Jan. 1 to 6 estimated 200 second-feet, varying from about 126 to 260 second-feet.
Mean discharge Jan. 7 to 15 estimated 90 second-feet, varying from about 85 to 95 second-feet.
Mean discharge Jan. 16 to Feb. 2 estimated 155 second-feet, varying from about 135 to 200 second-feet.
Mean discharge Feb. 3 to 15 estimated 100 second-feet, varying from about 85 to 125 second-feet.
Mean discharge Feb. 16 to 27 estimated 170 second-feet, varying from about 140 to 200 second-feet.
Mean discharge Mar. 1 to 31 estimated 190 second-feet.
Mean discharge Apr. 1 to 13 estimated 170 second-feet, varying from about 90 to 250 second-feet.
Mean discharge Nov. 22 to 30 estimated 92 second-feet, varying from about 90 to 95 second-feet.
Mean discharge Dec. 1 to 31, estimated 130 second-feet.

Monthly discharge of Cloquet River at Independence, Minn., for 1912.

[Drainage area, 698 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			150	0.215	0.25	D.
February			140	.201	.22	D.
March			190	.272	.31	C.
April			318	.456	.51	C.
May	2,250	302	1,320	1.89	2.18	A.
June	2,390	165	939	1.35	1.51	B.
July	3,120	55	823	1.18	1.36	B.
August	465	60	216	.309	.36	A.
September	330	79	222	.318	.35	A.
October	1,600	85	487	.698	.80	B.
November	257	64	140	.201	.22	C.
December			130	.186	.21	D.
The year	3,120	55	425	.609	8.28	

NOTE.—See footnotes to tables of daily gage height and daily discharge.

STREAMS TRIBUTARY TO LAKE MICHIGAN.

ESCANABA RIVER NEAR ESCANABA, MICH.

Location.—At highway bridge between Escanaba and Gladstone, Mich., about 9 miles north of Escanaba and 4 miles above mouth of river, T. 40 N., R. 23 W., at quarter-section corner between secs. 24 and 25.

Records available.—August 25, 1903, to March 31, 1909; June 1, 1909, to December 31, 1912. Discharge measurements only April, May, and July, 1903.

Drainage area.—800 square miles.

Gage.—Standard chain, attached to bridge; new gage installed November 15, 1910.

Channel.—Probably permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Affected by ice which exists some years for nearly 4 months.

Accuracy.—Relation between gage height and discharge, during the logging season, affected by backwater from log jams. All gage readings for 1912 are correct, provided the new chain (installed Nov. 15, 1910) has not stretched, and provided, also, that the structure to which the gage is attached has not changed since July 16, 1908.

Daily gage height, in feet, of Escanaba River near Escanaba, Mich., for 1912.

[Miss Olive Beauchamp, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	......	......	4.1	4.3	3.6	2.1	2.2	3.1	2.4	2.7	4.4
2	5.9	......	3.6	4.3	4.1	3.3	2.0	2.1	3.2	2.5	2.7	3.9
3	6.0	......	......	4.6	4.0	3.3	2.2	2.1	3.2	2.5	2.6	3.6
4	5.9	......	......	5.2	4.0	3.2	2.2	2.1	3.1	2.6	2.6	3.6
5	5.8	......	......	5.4	4.4	3.1	2.1	2.0	2.9	2.6	2.7	3.5
6	5.9	......	......	5.5	4.6	3.1	2.1	2.1	2.8	2.5	2.6	3.4
7	......	......	......	......	4.9	3.0	2.2	2.3	2.6	2.5	2.6	3.4
8	......	......	......	......	4.8	2.9	2.5	2.6	2.6	2.4	2.6	......
9	......	......	3.6	5.6	4.8	2.9	2.5	3.0	2.8	2.4	2.7	......
10	......	......	......	4.5	4.3	2.8	2.4	3.3	2.9	2.5	2.6	......
11	......	......	......	4.1	4.3	2.7	2.5	3.8	2.9	2.5	2.7	......
12	......	......	......	4.3	4.0	3.0	2.4	3.9	3.0	2.6	2.7	......
13	4.4	......	......	4.6	4.0	3.5	2.3	3.7	2.9	3.7	2.7	......
14	......	......	......	4.3	3.7	3.5	2.2	3.6	3.0	3.7	2.7	......
15	......	......	......	4.7	3.5	3.4	2.2	3.3	2.8	3.6	2.6	......
16	......	......	3.7	5.4	3.3	3.3	2.2	2.9	2.8	3.4	2.6	......
17	......	4.5	......	4.8	3.3	3.4	2.1	3.0	2.8	3.2	2.6	......
18	......	......	......	4.6	3.3	3.3	2.1	2.9	2.8	3.0	2.6	......
19	......	......	......	4.4	3.2	3.1	2.0	3.0	2.8	2.9	2.5	......
20	4.4	......	......	4.3	3.2	3.0	2.0	2.6	2.9	2.8	2.5	......
21	......	......	......	4.5	3.3	2.9	2.0	2.6	2.9	2.8	2.5	......
22	......	......	......	4.6	3.4	2.8	2.1	2.6	2.9	3.0	2.6	......
23	......	......	3.5	4.9	4.0	2.6	2.0	2.6	3.0	3.2	2.6	......
24	......	4.0	......	5.1	4.5	2.6	2.2	2.6	3.1	3.1	2.5	......
25	......	......	......	5.1	4.3	2.5	2.2	2.6	3.2	3.2	2.6	......
26	......	......	......	4.9	4.1	2.4	2.2	2.6	3.3	3.0	2.6	4.1
27	4.3	......	......	5.0	3.9	2.3	2.3	2.6	3.1	3.0	2.6	......
28	......	......	......	4.8	4.1	2.2	2.1	2.6	3.1	2.9	2.5	......
29	......	......	......	4.7	4.4	2.2	2.1	2.6	3.0	2.9	2.7	......
30	......	......	3.6	4.5	4.1	2.1	2.2	2.6	3.0	2.8	4.6	......
31	......	......	......	......	4.1	......	2.2	2.6	......	2.8	......	......

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Mar. 31, and Nov. 30 to Dec. 31. The ice went out sometime between Apr. 1 and 5.

Daily discharge, in second-feet, of Escanaba River near Escanaba, Mich., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2,530	2,860	1,810	350	410	1,180	550	790
2	2,860	2,530	1,420	300	350	1,300	630	790
3	3,400	2,380	1,420	410	350	1,300	630	710
4	4,650	2,380	1,300	410	350	1,180	710	710
5	5,120	3,080	1,180	350	300	970	710	790
6	5,360	3,400	1,180	350	350	880	630	710
7	5,440	4,000	1,070	410	480	710	630	710
8	5,530	3,790	970	630	710	710	550	710
9	5,610	3,790	970	630	1,070	880	550	790
10	3,210	2,860	880	550	1,420	970	630	710
11	2,530	2,860	790	630	2,090	970	630	790
12	2,860	2,380	1,070	550	2,230	1,070	710	790
13	3,400	2,380	1,680	480	1,950	970	1,950	790
14	2,860	1,950	1,680	410	1,810	1,070	1,950	790
15	3,590	1,680	1,550	410	1,420	880	1,810	710
16	5,120	1,420	1,420	410	970	880	1,550	710
17	3,790	1,420	1,550	350	1,070	880	1,300	710
18	3,400	1,420	1,420	350	970	880	1,070	710
19	3,030	1,300	1,180	300	1,070	880	970	630
20	2,860	1,300	1,070	300	710	970	880	630
21	3,210	1,420	970	300	710	970	880	630
22	3,400	1,550	880	350	710	970	1,070	710
23	4,000	2,380	710	300	710	1,070	1,300	710
24	4,430	3,210	710	410	710	1,180	1,180	630
25	4,430	2,860	630	410	710	1,300	1,300	710
26	4,000	2,530	550	410	710	1,420	1,070	710
27	4,210	2,230	480	480	710	1,180	1,070	710
28	3,790	2,530	410	350	710	1,180	970	630
29	3,590	3,030	410	350	710	1,070	970	790
30	3,210	2,530	350	410	710	1,070	880	900
31	....	2,530	....	410	710	....	880	....

NOTE.—Daily discharge determined from a rating curve well defined about 300 second-feet. Discharge Apr. 1 to 5 may be somewhat high because of ice effect. Discharge Nov. 30 estimated by comparison with Menominee River.

Monthly discharge of Escanaba River near Escanaba, Mich., for 1912.

[Drainage area, 800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	900	1.12	1.29	D.
February	....	....	850	1.06	1.14	D.
March	....	....	830	1.04	1.20	D.
April	5,610	2,530	3,850	4.81	5.37	B.
May	4,000	1,300	2,450	3.06	3.53	B.
June	1,810	350	1,060	1.32	1.47	B.
July	630	300	412	.515	.59	B.
August	2,230	300	900	1.12	1.29	B.
September	1,420	710	1,030	1.29	1.44	B.
October	1,950	550	987	1.23	1.42	B.
November	900	630	727	.909	1.01	B.
December	....	....	650	.812	.94	D.
The year	5,610	300	1,220	1.52	20.69	

NOTE.—Discharge Jan. 1 to Mar. 31 and Nov. 30 to Dec. 31 estimated by comparison with the record of flow of Menominee River.

MENOMINEE RIVER NEAR IRON MOUNTAIN, MICH.

Location.—At the Homestead highway bridge, 3½ miles south of Iron Mountain, Mich.

Records available.—September 4, 1902, to March 31, 1909; June 5, 1909, to December 31, 1912.

Drainage area.—2,420 square miles.

Gage.—Standard chain, attached to the bridge May 18, 1904; the original gage was a staff on the right abutment of the bridge.

Channel.—Probably permanent.

Artificial control.—The flow of the river is to a certain extent controlled by logging dams.

Winter flow.—It is reported under good authority that owing to the presence of a stream of water from the Iron Mountain mines flowing into the river a short distance above the gage, and to the fact that there are heavy rapids below the gage, ice seldom causes backwater at the gage.

Accuracy.—Records will have to be used with caution, as no discharge measurements have been made since 1910 and backwater may be caused by ice and logs during certain portions of the year.

Cooperation.—Gage checked with level and information regarding ice furnished by H. G. Roby, resident engineer, Peninsular Power Co., of Madison, Wis.

Daily gage height, in feet, of Menominee River near Iron Mountain, Mich., for 1912.

[A. J. St. Arnauld, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	3.6	3.2	3.4	7.0	6.0	2.7	2.2	5.0	2.2	2.2	2.0
2	3.3	3.2	3.2	3.5	6.0	6.0	2.2	2.1	5.0	2.3	2.2	2.6
3	3.3	3.6	3.2	3.5	7.1	5.8	1.9	2.1	4.8	2.2	2.2	2.6
4	3.3	3.6	3.0	3.5	8.0	5.8	1.9	2.1	4.8	2.2	2.2	2.6
5	3.3	3.1	2.8	4.7	8.5	5.4	1.9	2.0	4.6	2.2	2.2	3.0
6	3.3	3.1	2.8	5.9	9.7	5.2	2.2	2.0	4.4	2.2	2.2	3.6
7	4.8	3.0	2.8	7.4	10.9	5.0	2.2	2.5	4.0	2.3	2.2	3.8
8	4.8	3.5	2.8	8.3	11.0	4.2	2.1	3.3	3.8	2.0	2.2	3.2
9	4.6	3.5	2.8	8.0	10.6	4.2	2.1	3.6	3.6	1.9	2.2	2.8
10	4.4	3.5	3.2	7.5	10.0	3.8	2.3	4.2	3.6	2.0	2.2	2.6
11	4.0	3.3	3.1	6.5	9.0	3.6	2.3	8.1	4.0	2.0	2.3	2.6
12	3.6	3.0	2.9	6.7	9.0	3.8	2.2	7.9	4.0	2.8	2.3	2.4
13	3.3	3.0	2.9	7.2	8.7	3.8	1.9	7.3	3.9	5.4	2.3	2.3
14	3.0	3.0	2.9	6.7	8.4	4.0	1.8	6.1	3.6	5.1	2.2	2.3
15	3.0	3.0	3.1	5.5	8.2	4.0	1.8	5.4	3.4	5.0	2.2	2.3
16	3.0	3.3	3.1	7.7	7.7	4.6	1.6	5.0	3.2	4.5	2.1	2.3
17	3.0	3.6	3.2	5.5	6.3	4.4	1.7	5.0	3.1	4.0	2.0	2.3
18	3.0	3.3	3.2	5.5	5.8	4.2	1.6	5.0	3.0	3.6	1.8	2.3
19	3.0	3.3	3.3	5.4	5.6	4.0	1.6	5.0	2.9	3.1	1.8	2.3
20	3.0	3.6	3.3	5.0	4.8	4.0	1.6	5.0	3.0	3.1	1.6	2.3
21	2.9	3.3	3.3	7.5	4.6	3.7	1.6	5.0	3.1	2.9	1.7	2.3
22	2.7	3.3	3.3	7.2	6.4	3.7	1.6	5.0	3.1	2.9	1.6	2.3
23	2.5	3.3	3.3	7.6	7.2	3.6	1.6	5.1	3.1	2.9	1.6	2.3
24	4.0	3.3	3.3	8.0	7.7	2.9	2.0	5.0	3.1	2.6	1.6	2.2
25	4.0	3.3	3.3	8.3	7.2	2.7	2.1	4.7	3.0	2.6	1.6	2.3
26	4.0	3.3	3.3	8.7	7.0	2.6	2.0	4.4	2.9	2.6	1.7	2.3
27	4.0	3.2	3.4	9.0	6.7	2.5	1.9	4.5	2.7	2.6	1.7	2.5
28	4.0	3.2	3.6	9.0	7.1	2.5	1.9	4.7	2.7	2.4	1.7	2.2
29	3.6	3.2	3.9	9.0	7.1	2.5	2.1	4.7	2.7	2.2	1.7	2.0
30	3.1	....	3.9	7.0	6.8	2.5	2.2	4.9	2.6	2.2	1.9	2.0
31	3.0	....	3.8	....	6.8	....	2.3	5.1	....	2.2	....	2.0

NOTE.—Apparently no backwater from ice during 1912.

Daily discharge, in second-feet, of Menominee River near Iron Mountain, Mich., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,440	2,660	2,360	2,510	5,660	4,680	2,010	1,680	3,750	1,680	1,680	1.560
2	2,440	2,360	2,360	2,580	4,680	4,680	1,680	1,620	3,750	1,750	1,680	1,940
3	2,440	2,660	2,360	2,580	5,760	4,490	1,500	1,620	3,580	1,680	1,680	1,940
4	2,440	2,660	2,220	2,580	6,740	4,490	1,500	1,620	3,580	1,680	1,680	1,940
5	2,440	2,290	2,080	3,500	7,220	4,110	1,500	1,560	3,420	1,680	1,680	2,220
6	2,440	2,290	2,080	4,580	8.710	3,930	1,680	1,560	3,260	1,680	1,680	2,660
7	3,580	2,220	2,080	6,080	10,200	3,750	1,680	1,880	2,960	1,750	1,680	2,810
8	3,580	2,580	2,080	7,080	10,300	3,110	1,620	2,440	2,810	1,560	1,680	2.360
9	3,420	2,580	2,080	6,740	9,800	3,110	1,620	2,660	2,660	1,500	1,680	2.080
10	3,260	2,580	2,360	6,180	9,070	2,810	1,750	3,110	2,660	1,560	1,680	1,940
11	2,960	2,440	2,290	5,160	7,890	2,660	1,750	6,860	2,960	1,560	1,750	1,940
12	2,660	2,220	2,150	5,360	7,890	2,810	1,680	6,640	2,960	2,080	1,750	1,820
13	2,440	2,220	2,150	5,860	7,440	2,810	1,500	5,970	2,880	4,110	1,750	1,750
14	2,220	2,220	2,150	5,360	7,100	2,960	1,440	4,780	2,660	3,840	1,680	1,750
15	2,220	2,220	2,290	4,200	6,970	2,960	1,440	4,110	2,510	3,750	1,680	1,750
16	2,220	2,440	2,290	6,400	6,400	3,420	1,340	3,750	2,360	3,340	1,620	1,750
17	2,220	2,660	2,360	4,200	4,960	3,260	1,390	3,750	2,290	2,960	1,560	1.750
18	2,220	2,440	2,360	4,200	4,490	3,110	1,340	3,750	2,220	2,660	1,440	1,750
19	2,220	2,440	2,440	4,110	4,300	2,960	1,340	3,750	2,150	2,290	1,440	1.750
20	2,220	2,660	2,440	3,750	3,580	2,960	1,340	3,750	2,220	2,290	1,340	1,750
21	2,150	2,440	2,440	6,180	3,420	2.740	1,340	3.750	2,290	2,150	1,390	1.750
22	2,010	2,440	2,440	5,860	5,060	2,740	1,340	3,750	2,290	2,150	1,340	1,750
23	1,880	2,440	2,440	6,300	5,860	2,660	1,340	3,840	2,290	2,150	1,340	1,750
24	2,960	2,440	2,440	6,740	6,400	2,150	1,560	3,750	2,290	1,940	1,340	1,680
25	2,960	2,440	2,440	7,080	5,860	2,010	1,620	3,500	2,220	1,940	1,340	1,750
26	2,960	2,440	2,440	7,440	5,660	1,940	1,560	3,260	2,150	1,940	1,390	1.750
27	2,960	2,360	2,510	7,890	5,360	1,880	1,500	3,340	2,010	1,940	1,390	1,880
28	2,960	2,360	2,660	7,890	5,760	1,880	1,500	3,500	2,010	1,820	1,390	1,680
29	2,660	2,360	2,880	7,890	5,760	1,880	1,620	3,500	2,010	1,680	1,390	1,560
30	2,290	....	2,880	5,660	5,460	1,880	1,680	3,660	1,940	1,680	1,500	1,560
31	2,220	....	2,810	....	5,460	....	1,750	3,840	....	1,680	....	1,560

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Menominee River near Iron Mountain, Mich., for 1912.

[Drainage area, 2,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	3,580	1,880	2,580	1.07	1.23	C.
February	2,660	2,220	2,430	1.00	1.08	C.
March	2,880	2,080	2,370	.979	1.13	C.
April	7,890	2,510	5,400	2.23	2.49	B.
May	10,300	3,420	6,430	2.66	3.07	B.
June	4,680	1,880	3,030	1.25	1.40	B.
July	2,010	1,340	1,550	.640	.74	B.
August	6,860	1,560	3,440	1.42	1.64	B.
September	3,750	1,940	2,640	1.09	1.22	B.
October	4,110	1,500	2,140	.884	1.02	B.
November	1,750	1,340	1,550	.640	.71	B.
December	2,810	1,560	1,870	.773	.89	B.
The year	10,300	1,340	2,950	1.22	16.62	

WOLF RIVER AT KESHENA, WIS.

Location.—At the highway bridge at Keshena, 3 miles below the outlet of the West Branch of Wolf River, which enters from the right.

Records available.—May 9, 1907, to March 31, 1909; February 10, 1911, to December 31, 1912.[1]

Drainage area.—797 square miles.

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[1] See also Water powers of Wisconsin: Bull. Wisconsin Geol. and Nat. Hist. Survey No. 20, 1908, pp. 100-102.

Gage.—A vertical staff gage has been maintained at the same datum since installation. The gage was read twice daily up to October 1, 1911. Since that date mean of three readings (morning, noon, and evening) taken as mean for day.

Channel.—Gravel; smooth and practically permanent.

Discharge measurements.—Made from the bridge.

Artificial control.—The river and main tributaries above Keshena are controlled to some extent by logging dams.

Winter flow.—During the winter solid ice forming in the vicinity of the gage causes 1 to 3 feet of backwater. At times during the winter slush and frazil ice collect under this ice cover, making it impossible to make discharge measurements. The ice forms at the falls above Keshena and floats in the river as far as backwater from the dam at Shawano.

Accuracy.—During open-water season the accuracy depends upon the accuracy with which the mean gage height is determined. Conditions favor the accurate determination of discharge.

Discharge measurements of Wolf River at Keshena, Wis., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 13[a]	S. B. Soulé	3.96	342
Oct. 29	.....do	2.25	889
31	.....do	2.20	870

[a] Complete ice cover. Average thickness of ice, 2.4 feet.

Daily gage height, in feet, of Wolf River at Keshena, Wis., for 1912.

[R. and N. Gauthier, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.4	4.1	2.6	2.4	3.0	3.4	1.4	2.2	5.7	2.2	2.4	2.0
2	5.5	4.0	2.6	2.6	3.0	3.3	1.6	2.0	6.7	2.0	2.3	2.8
3	5.6	4.1	2.5	2.6	3.0	3.2	1.6	2.0	5.6	2.2	2.1	2.9
4	5.7	4.2	2.4	2.7	3.1	3.0	1.9	1.8	5.0	2.3	2.0	2.8
5	4.7	4.3	2.4	2.8	3.7	3.0	2.1	1.8	4.6	2.4	2.0	2.8
6	4.7	4.2	2.3	2.9	4.0	2.8	1.8	1.7	4.2	2.2	2.0	2.8
7	4.8	4.0	2.2	3.0	3.8	2.7	1.9	2.0	4.0	2.2	2.0	2.7
8	5.2	3.9	2.2	3.2	3.5	2.6	2.0	2.4	3.6	2.4	2.0	2.7
9	5.4	3.6	2.3	3.4	3.4	2.4	2.1	3.1	3.5	2.4	2.2	2.6
10	5.5	3.7	2.2	3.2	3.2	2.4	2.0	3.9	3.3	2.3	2.2	3.0
11	5.4	3.6	2.1	3.2	3.0	2.4	2.1	4.6	3.5	2.4	2.1	2.8
12	5.4	3.7	2.0	3.2	3.1	2.3	2.0	4.2	3.2	2.5	2.2	2.6
13	5.3	3.6	1.9	3.1	3.2	2.4	2.0	4.3	3.1	2.8	2.2	3.0
14	5.2	3.6	1.6	3.2	3.2	2.3	2.0	4.0	2.8	2.8	2.5	3.8
15	4.7	3.6	1.5	3.3	3.1	2.3	2.1	3.8	2.8	2.8	2.3	4.5
16	4.7	3.6	1.6	3.3	3.1	2.3	2.0	3.4	2.8	2.4	2.3	4.5
17	4.5	3.5	1.7	3.2	3.2	2.2	2.1	3.5	3.2	2.4	2.2	4.5
18	4.5	3.4	1.7	3.0	3.0	2.0	2.0	3.6	3.1	2.3	2.3	4.4
19	4.4	3.4	1.7	2.8	2.9	2.0	1.8	3.6	2.9	2.5	2.2	4.3
20	4.5	3.5	1.6	2.8	2.9	2.0	1.6	3.5	2.7	2.2	2.2	4.4
21	4.6	3.6	1.5	2.8	2.8	1.8	1.6	3.2	2.7	2.3	2.2	4.5
22	4.5	3.5	1.4	3.4	2.8	1.6	1.6	2.8	2.6	2.5	2.2	4.4
23	4.4	3.4	1.5	3.6	2.8	1.6	1.7	2.8	2.6	2.5	2.1	4.7
24	4.3	3.3	1.6	3.5	2.9	1.5	5.7	2.6	2.6	2.2	2.3	5.1
25	4.3	3.2	1.7	3.4	2.8	1.5	5.2	2.7	2.8	2.3	2.1	5.4
26	4.3	3.2	1.8	3.3	2.8	1.6	4.7	2.5	2.7	2.2	2.0	5.5
27	4.2	3.0	1.8	3.4	3.0	1.6	4.2	2.4	2.7	2.3	1.9	5.4
28	4.4	2.8	1.8	3.3	3.3	1.4	3.4	2.5	2.7	2.2	2.0	5.5
29	4.3	2.8	1.9	3.2	3.4	1.4	2.9	2.8	2.8	2.4	2.0	5.4
30	4.2	....	1.7	3.1	3.4	1.4	2.5	2.4	2.7	2.4	1.9	5.4
31	4.2	....	2.1	....	3.5	....	2.3	2.3	....	2.4	....	5.3

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 30 and about Dec. 10 to 31.

Daily discharge, in second-feet, of Wolf River at Keshena, Wis., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	962	1,280	1,530	536	869	3,140	869	962	780
2	1,060	1,280	1,460	614	780	3,910	780	915	1,170
3	1,060	1,280	1,400	614	780	3,060	869	824	1,220
4	1,110	1,340	1,280	737	695	2,620	915	780	1,170
5	1,170	1,720	1,280	824	695	2,330	962	780	1,170
6	1,220	1,920	1,170	695	654	2,060	869	780	1,170
7	1,280	1,790	1,110	737	780	1,920	869	780	1,110
8	1,400	1,590	1,060	780	962	1,660	962	780	1,110
9	1,530	1,530	962	824	1,340	1,590	962	869	1,060
10	1,400	1,400	962	780	1,850	1,460	915	869	....
11	1,400	1,280	962	824	2,330	1,590	962	824	....
12	1,400	1,340	915	780	2,060	1,400	1,010	869	....
13	1,340	1,400	962	780	2,120	1,340	1,170	869	....
14	1,400	1,400	915	780	1,920	1,170	1,170	1,010	....
15	1,460	1,340	915	824	1,790	1,170	1,170	915	....
16	1,460	1,340	915	780	1,530	1,170	962	915	....
17	1,400	1,400	869	824	1,590	1,400	962	869	....
18	1,280	1,280	780	780	1,660	1,340	915	915	....
19	1,170	1,220	780	695	1,660	1,220	1,010	869	....
20	1,170	1,220	780	614	1,590	1,110	869	869	....
21	1,170	1,170	695	614	1,400	1,110	915	869	....
22	1,530	1,170	614	614	1,170	1,060	1,010	869	....
23	1,660	1,170	614	654	1,170	1,060	1,010	824	....
24	1,590	1,220	575	3,140	1,060	1,060	869	915	....
25	1,530	1,170	575	2,770	1,110	1,170	915	824	....
26	1,460	1,170	614	2,400	1,010	1,110	869	780	....
27	1,530	1,280	614	2,060	962	1,110	915	737	....
28	1,460	1,460	536	1,530	1,010	1,110	869	780	....
29	1,400	1,530	536	1,220	1,170	1,170	962	780	....
30	1,340	1,530	536	1,010	962	1,110	962	737	....
31	....	1,590	....	915	915	....	962	....	....

NOTE.—Daily discharge computed from a rating curve well defined between 400 and 2,000 second-feet. Discharge Jan. 1 to Mar. 30 and Dec. 10 to 31 estimated, because of ice, from two discharge measurements, observer's reports, climatologic records, and flow of West Branch Wolf River at Neopit. Mean discharge, Jan. 1 to 31 estimated 620 second-feet, varying from about 770 to 470 second-feet; mean discharge Feb. 1 to 29 estimated 380 second-feet, varying from about 460 to 340 second-feet; mean discharge Mar. 1 to 30 estimated 430 second-feet, varying from about 350 to 700 second-feet; mean discharge Dec. 10 to 31 estimated 920 second-feet, varying from about 1,040 to 840 second-feet.

Monthly discharge of Wolf River at Keshena, Wis., for 1912.

[Drainage area, 797 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	620	0.778	0.90	C.
February	....	....	380	.477	.51	C.
March	824	....	443	.556	.64	C.
April	1,660	962	1,340	1.68	1.87	A.
May	1,920	1,170	1,380	1.73	1.99	A.
June	1,530	536	897	1.13	1.26	A.
July	3,140	536	1,020	1.28	1.48	A.
August	2,330	654	1,280	1.61	1.86	A.
September	3,910	1,060	1,590	1.99	2.22	A.
October	1,170	780	949	1.19	1.37	A.
November	1,010	737	846	1.06	1.18	A.
December	1,220	....	974	1.22	1.41	C.
The year	3,910	....	978	1.23	16.69	

NOTE.—See note to table of daily discharge.

WEST BRANCH OF WOLF RIVER AT NEOPIT, WIS.

Location.—At the dam and power plant at Neopit, a station of the Wisconsin Northern Railroad, 20 miles north of Shawano.

Records available.—January 25 to December 31, 1912.

Drainage area.—108 square miles.

Gage.—Vertical staff.

Determination of flow.—An attempt in 1911 to measure the flow by current meter a short distance below the dam proved unsatisfactory, and it was decided to rate the turbine and spillway. The power is developed by means of a timber dam, about 14 feet high, which backs the water upstream for a considerable distance and forms a service reservoir. The spillway is a rectangular opening about 13 feet wide, which is closed by means of stop planks. Little water leaks through the dam, but considerable passes between the planks when all are in place. The power house is at the dam and is equipped with a 35-inch Leffel-Samson turbine, belted to a 60-kilowatt generator, which is used chiefly for lighting. The turbine takes water from the service reservoir through a rectangular flume, which is 9 feet wide by 6 feet deep and is lined with smooth planks. The turbine was rated by means of current meter measurements in the flume. The spillway and leakage through the boards were rated by measurements in the sluiceway. Gages were placed in the pond and below the dam to show the head on the turbine. Readings of both gages, voltage, amperage, and number of planks removed from the spillway were recorded seven times each day, at 6, 7, and 10 a. m., 12 m., 3, 6, and 10 p. m. These readings were then weighted in accordance with the elapsed interval.

Accuracy.—Current meter measurements made October 30, 1912, and January 29, 1913, indicate that the records were being carefully taken and that the computations give results well within 10 per cent.

Daily discharge, in second-feet, of West Branch of Wolf River at Neopit, Wis., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	147	135	107	128	141	138	124	70	......	......	142	175
2	140	166	141	128	129	133	122	80	......	......	139	208
3	139	122	113	123	152	144	112	130	......	......	119	208
4	135	155	91	165	229	160	167	120	......	......	141	197
5	137	135	130	169	244	129	61	115	......	......	148	183
6	93	150	101	212	217	140	123	122	......	......	148	190
7	67	149	91	211	211	171	222	149	......	......	146	129
8	147	98	84	172	186	167	61	208	......	......	143	122
9	109	115	86	196	149	127	145	313	......	......	85	130
10	109	108	134	189	169	156	158	429	......	......	149	149
11	135	146	98	216	187	167	134	345	......	......	161	142
12	111	124	82	236	182	185	131	182	......	......	160	130
13	111	147	94	141	162	150	148	214	......	......	170	129
14	89	123	115	205	188	137	160	217	......	......	170	134
15	99	128	111	208	221	90	117	170	......	......	165	129
16	100	144	95	217	157	137	123	141	......	......	162	146
17	89	134	135	214	182	118	142	174	......	......	96	149
18	106	162	84	62	184	147	140	......	......	......	115	147
19	100	163	123	137	181	156	87	......	......	......	110	119
20	104	167	92	180	158	130	126	......	......	......	83	135
21	138	155	79	235	158	99	118	......	......	......	75	145
22	133	114	112	198	234	95	101	......	......	......	82	129
23	99	123	106	233	164	115	352	......	......	......	117	113
24	133	112	131	147	131	152	999	......	......	......	159	157
25	141	141	106	84	153	95	648	......	......	......	149	134
26	118	121	108	188	141	105	217	......	......	......	121	151
27	136	98	133	206	185	114	141	......	......	......	127	123
28	147	114	143	322	202	180	183	......	......	......	112	118
29	125	108	103	115	179	90	136	......	......	......	131	179
30	169	......	150	165	153	113	73	......	......	......	175	118
31	124	......	166	......	180	......	253	......	......	137	......	104

Monthly discharge of West Branch of Wolf River at Neopit, Wis., for 1912.

[Drainage area, 106 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	169	67	120	1.11	1.28	B.
February	167	98	133	1.23	1.33	B.
March	166	79	111	1.03	1.19	B.
April	322	62	180	1.67	1.86	B.
May	244	129	178	1.65	1.90	B.
June	185	90	135	1.25	1.40	B.
July	999	61	188	1.74	2.01	B.
August 1-17	429	70	187	1.73	1.09	B.
November	175	75	133	1.23	1.37	B.
December	208	104	146	1.35	1.56	B.

GRAND RIVER AT GRAND RAPIDS, MICH.

Location.—At Fulton Street Bridge in Grand Rapids, Mich.

Records available.—March 12, 1901, to December 31, 1912.

Drainage area.—4,900 square miles.

Gage.—Staff, attached to bridge. In November, 1907, a new staff gage with zero corresponding to the city datum was attached to the abutment of the bridge. Readings on this gage were first reported in December, 1907. The zero of the gage in use prior to November, 1907, was 0.55 foot below the city datum; all gage readings, however, were corrected to the city datum and all published gage heights are therefore referred to the same datum.

Discharge measurements.—Made from downstream side of the bridge.

Winter flow.—Somewhat affected by ice.

Artificial control.—The operation of power plants above the station may modify the low-water flow.

Accuracy.—The two or three measurements made at this station since 1905 indicate that the 1905 discharge curve is not applicable after that year.

Cooperation.—Records furnished by the city engineer of Grand Rapids.

Daily gage height, in feet, of Grand River at Grand Rapids, Mich., for 1912.

[A. J. Seys and Chas. Darling, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	0.9	0.4	10.0	3.3	5.4	−1.1	1.4	......	−0.3	0.2	......
2	2.5	.8	.3	11.7	3.5	......	−1.1	1.4	......	− .4	.2	2.7
3	2.6	.9	......	13.0	3.2	3.8	−1.22	1.4	−0.3	− .55	......	3.3
4	2.8	......	.4	13.6	3.0	3.2	......	......	− .65	− .5	.4	3.8
5	3.6	.9	.4	14.3	......	2.7	−1.2	.3	− .82	− .6	1.1	3.9
6	3.7	.8	.4	15.2	2.4	2.4	−1.2	.2	− .8	......	2.0	4.3
7	......	.8	.4	16.0	2.2	1.8	......	− .1	− .7	− .5	4.2	4.2
8	3.8	.8	.4	15.8	1.8	1.9	−1.0	− .08	......	− .85	5.8	......
9	4.0	.8	.4	15.3	1.7	......	− .75	− .1	−1.0	− .85	6.4	3.0
10	4.2	.8	......	14.2	1.4	.4	.0	1.2	− .9	− .4	......	2.1
11	4.0	......	.2	12.9	1.4	.4	− .5	......	−1.0	.5	5.2	1.6
12	3.6	.9	.2	11.6	......	.4	− .85	1.3	−1.05	2.8	4.5	1.0
13	3.0	.8	.2	10.2	3.3	.1	− .52	1.0	−1.1	......	4.5	1.6
14	......	.8	.2	......	4.9	− .2	......	.9	−1.1	3.3	5.4	1.8
15	2.8	.8	.1	8.2	5.6	− .4	− .58	.6	......	3.0	6.4	......
16	2.6	.7	.2	7.2	5.8	......	− .62	.4	− .7	2.5	6.9	2.[illegible]
17	2.5	.5	......	6.5	5.9	.0	− .58	− .2	− .2	2.1	......	2.3
18	2.4	......	.2	6.4	5.7	− .3	− .85	......	.0	1.7	6.2	2.2
19	2.5	.3	.4	6.3	......	− .3	−1.05	− .1	.2	1.4	5.3	1.6
20	2.2	.4	1.4	6.2	5.2	− .2	−1.15	.1	.2	......	4.5	1.4
21	......	.6	2.4	......	5.6	− .65	......	.1	.2	.6	4.0	.5
22	2.2	......	3.8	6.1	6.6	− .83	1.2	.2	......	.4	3.2	......
23	2.0	.8	4.2	5.2	7.8	......	1.6	.2	.0	.7	2.8	.0
24	1.9	.4	......	4.5	9.4	− .75	3.6	.1	.0	.6	......	.3
25	1.8	......	4.6	4.0	10.1	− .9	3.8	......	− .1	.3	2.9	......
26	1.7	.1	4.6	3.6	......	−1.0	3.6	− .3	− .2	.2	2.4	.4
27	1.5	.2	4.8	3.2	8.8	−1.0	3.2	− .3	− .3	......	2.2	.6
28	......	.2	5.4	......	7.7	− .8	......	− .1	− .4	.0	......	.2
29	1.2	.2	6.4	2.8	7.2	−1.1	2.2	− .55	......	− .2	1.9	.0
30	1.0	......	7.6	3.0	......	......	2.2	− .68	− .3	− .1	1.8	.2
31	.9	......	......	......	6.1	......	1.7	− .60	......	− .2	......	......

NOTE.—The ice on the river was half a foot thick Jan. 12. No other information available regarding ice.

MANISTEE RIVER NEAR SHERMAN, MICH.

Location.—At north bridge, 1 mile from Sherman, Mich., immediately above the mouth of Wheeler Creek.

Records available.—July 10, 1903, to December 31, 1912.

Drainage area.—900 square miles.

Gage.—Standard chain; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Special studies are necessary to determine the winter flow as the stream freezes over. The constancy of flow is remarkable, and is due to the fact that the supply is derived from springs and ground water. The maximum recorded mean flow for any month from 1903 to 1908 is only two and one-half times the minimum recorded flow. Consequently a fairly close estimate of the discharge for the periods during which ice is present can be made by using climatological data and the general records.

Accuracy.—Observations in 1910–11 indicate that the relation of gage height to discharge remains unchanged but may at times be affected by backwater from log jams.

Cooperation.—Station maintained in cooperation with William G. Fargo.

Daily gage height, in feet, of Manistee River near Sherman, Mich., for 1912.

[Miss Margaret Munn, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	2.8	2.3	3.0	2.8	5.5	2.3	2.3	2.9	2.7	2.5	3.0
2	2.9	2.8	2.3	3.0	2.8	4.8	2.2	2.3	3.2	2.6	2.6	3.5
3	2.9	2.6	2.0	2.9	2.8	4.1	2.2	2.3	3.4	2.7	2.6	3.8
4	2.9	2.6	2.4	2.9	2.8	3.8	2.2	2.3	3.4	2.7	2.6	3.8
5	2.9	2.4	2.4	3.8	2.7	3.6	2.3	2.2	3.6	2.8	2.6	3.7
6	2.9	2.5	2.3	5.2	2.8	3.5	2.4	2.2	3.5	2.8	2.6	3.7
7	3.3	2.0	2.4	5.3	2.8	3.3	2.8	2.2	3.3	2.6	2.7	3.6
8	3.4	2.4	2.4	5.2	2.8	3.2	3.2	2.3	3.3	2.5	2.8	3.5
9	3.4	2.3	2.5	5.0	2.7	3.1	3.0	2.8	3.6	2.5	2.8	3.3
10	3.4	2.3	2.5	4.5	2.6	3.0	2.7	3.3	3.5	2.6	2.8	3.1
11	3.2	2.3	2.4	4.2	2.7	2.9	2.6	3.2	3.5	2.6	2.9	3.0
12	3.2	2.4	2.4	4.2	3.0	2.9	2.4	2.9	3.3	2.9	2.9	2.9
13	3.2	2.4	2.4	4.2	3.3	3.0	2.5	2.7	3.2	3.0	3.5	2.8
14	3.4	2.4	2.4	4.2	3.4	3.0	2.6	2.5	3.0	3.0	3.9	2.7
15	3.4	2.4	2.1	4.2	3.3	2.9	2.6	2.4	3.1	3.0	4.0	3.0
16	3.4	2.6	2.3	4.0	3.2	2.8	2.5	2.4	3.0	2.9	4.0	3.1
17	3.4	2.7	2.3	3.8	3.1	2.8	2.4	2.4	2.7	2.8	3.8	3.2
18	3.4	2.7	2.4	3.7	3.0	2.7	2.4	2.5	2.8	2.7	3.5	3.0
19	3.5	2.9	2.5	3.6	2.9	2.7	2.4	2.6	3.3	2.7	3.4	3.0
20	3.4	2.8	2.7	3.5	3.4	2.6	2.3	2.6	3.2	2.7	3.4	2.9
21	3.3	2.6	2.6	3.4	3.9	2.6	2.3	2.6	3.0	2.7	3.3	2.9
22	3.2	1.8	2.5	3.3	4.1	2.6	2.3	2.7	3.0	2.7	3.3	2.8
23	3.2	2.0	2.4	3.8	4.5	2.5	2.3	2.6	3.0	2.8	3.3	2.8
24	3.1	2.0	2.4	3.7	4.8	2.5	2.6	2.6	2.9	2.8	3.2	2.7
25	3.0	2.3	2.3	3.6	4.7	2.4	2.6	2.5	2.9	2.7	3.2	2.8
26	2.9	2.6	2.3	3.4	4.5	2.4	2.6	2.5	2.8	2.7	3.2	2.8
27	2.8	2.5	2.4	3.3	4.2	2.4	2.4	2.5	2.7	2.6	3.2	2.7
28	2.8	2.5	2.5	3.2	5.2	2.3	2.5	2.6	2.7	2.6	3.1	2.7
29	2.8	2.3	2.6	3.0	6.2	2.3	2.6	2.6	2.7	2.6	3.0	2.7
30	2.9	....	2.9	2.9	6.4	2.3	2.4	2.7	2.7	2.5	3.0	2.7
31	2.8	....	3.0	....	5.9	....	2.4	2.8	....	2.5	....	2.7

NOTE.—Relation of gage height to discharge affected by ice Jan. 7 to 31. Gage heights Jan. 7 to 28 are to top of ice.

Daily discharge, in second-feet, of Manistee River near Sherman, Mich., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,210	1,170	987	1,250	1,170	2,410	987	987	1,210	1,140	1,060	1,250
2	1,210	1,170	987	1,250	1,170	2,060	952	987	1,330	1,100	1,100	1,460
3	1,210	1,100	1,100	1,210	1,170	1,730	952	987	1,420	1,140	1,100	1,590
4	1,210	1,100	1,020	1,210	1,170	1,590	952	987	1,420	1,140	1,100	1,590
5	1,210	1,020	1,020	1,590	1,140	1,500	987	952	1,500	1,170	1,100	1,550
6	1,210	1,060	987	2,260	1,170	1,460	1,020	952	1,460	1,170	1,100	1,550
7	......	1,100	1,020	2,310	1,170	1,380	1,170	952	1,380	1,100	1,140	1,500
8	......	1,020	1,020	2,260	1,170	1,330	1,330	987	1,380	1,060	1,170	1,460
9	......	987	1,060	2,160	1,140	1,290	1,250	1,170	1,500	1,060	1,170	1,380
10	......	987	1,060	1,910	1,100	1,250	1,140	1,380	1,460	1,100	1,170	1,290
11	......	987	1,020	1,770	1,140	1,210	1,100	1,330	1,460	1,100	1,210	1,250
12	......	1,020	1,020	1,770	1,250	1,210	1,020	1,210	1,380	1,210	1,210	1,210
13	......	1,020	1,020	1,770	1,380	1,250	1,060	1,140	1,330	1,250	1,460	1,170
14	......	1,020	1,020	1,770	1,420	1,250	1,100	1,060	1,250	1,250	1,640	1,140
15	......	1,020	917	1,770	1,380	1,210	1,100	1,020	1,290	1,250	1,680	1,250
16	......	1,100	987	1,680	1,330	1,170	1,060	1,020	1,250	1,210	1,680	1,290
17	......	1,140	987	1,590	1,290	1,170	1,020	1,020	1,140	1,170	1,590	1,330
18	......	1,140	1,020	1,550	1,250	1,140	1,020	1,060	1,170	1,140	1,460	1,250
19	......	1,210	1,060	1,500	1,210	1,140	1,020	1,100	1,380	1,140	1,420	1,250
20	......	1,170	1,140	1,460	1,420	1,100	987	1,100	1,330	1,140	1,420	1,210
21	......	1,100	1,100	1,420	1,640	1,100	987	1,100	1,250	1,140	1,380	1,210
22	......	819	1,060	1,380	1,730	1,100	987	1,140	1,250	1,140	1,380	1,170
23	......	883	1,020	1,5[illegible]0	1,910	1,060	987	1,100	1,250	1,170	1,380	1,170
24	......	883	1,020	1,550	2,060	1,060	1,100	1,100	1,210	1,170	1,330	1,140
25	......	987	987	1,500	2,010	1,020	1,100	1,060	1,210	1,140	1,330	1,170
26	......	1,100	987	1,420	1,910	1,020	1,100	1,060	1,170	1,140	1,330	1,170
27	......	1,060	1,020	1,380	1,770	1,020	1,020	1,060	1,140	1,100	1,330	1,140
28	......	1,060	1,060	1,330	2,260	987	1,060	1,100	1,140	1,100	1,290	1,140
29	......	987	1,100	1,250	2,790	987	1,100	1,100	1,140	1,100	1,250	1,140
30	......	......	1,210	1,210	2,900	987	1,020	1,140	1,140	1,060	1,250	1,140
31	......	......	1,250	......	2,630	......	1,020	1,170	......	1,060	......	1,140

NOTE.—Daily discharge determined from a rating curve well defined below 1,700 second-feet.

Monthly discharge of Manistee River near Sherman, Mich., for 1912.

[Drainage area, 900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	1,150	1.28	1.48	C.
February	1,210	819	1,060	1.17	1.26	A.
March	1,250	917	1,040	1.16	1.34	A.
April	2,310	1,210	1,600	1.78	1.99	A.
May	2,900	1,100	1,560	1.73	1.99	A.
June	2,410	987	1,270	1.41	1.57	A.
July	1,330	952	1,060	1.18	1.36	A.
August	1,380	952	1,080	1.20	1.38	A.
September	1,500	1,140	1,300	1.44	1.61	A.
October	1,250	1,060	1,140	1.27	1.46	A.
November	1,680	1,060	1,310	1.46	1.63	A.
December	1,590	1,140	1,280	1.42	1.64	A.
The year	2,900	819	1,240	1.38	18.71	

NOTE.—Mean discharge Jan. 7-31 estimated 1,140 second-feet by comparison with flow at adjacent stations.

STREAMS TRIBUTARY TO LAKE HURON.

AU SABLE RIVER AT BAMFIELD, MICH.

Location.—At remains of old wooden highway bridge at Bamfield, near Glennie post office, Mich., in the NW. ¼ sec. 14, T. 25 N., R. 5 E., about 600 feet above the mouth of Bamfields Creek.

Records available.—August 27, 1902, to December 31, 1912.

Drainage area.—1,420 square miles.

Gage.—Staff, fastened to wooden crib pier of the old bridge about 600 feet above the steel bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from the steel bridge about 600 feet below the wooden bridge at which measurements were formerly made. The steel bridge was begun in March and completed in July, 1907; part of the wooden bridge was removed when the steel bridge was finished. Bamfields Creek, which enters immediately above the steel bridge, carries only a few second-feet of water.

Winter flow.—The river is frozen over two or three months each year, but open places, probably caused by inflow from springs, are found throughout the winter.

Accuracy.—The relation between gage height and discharge is affected for short periods during the logging season by backwater from log jams and at times during the winter by backwater from anchor ice. Changes made in the channel below the gage when the new bridge was erected caused slight backwater at the gage. A measurement made in September, 1912, indicates a marked change in the relation between discharge and gage height subsequent to March, 1909.

Cooperation.—Station maintained in cooperation with William G. Fargo.

The following discharge measurement was made by P. S. Monk:

September 18, 1912: Gage height 2.30 feet; discharge, 1,450 second-feet.

Daily gage height, in feet, of Au Sable River at Bamfield, Mich., for 1912.

[Mrs. W. H. Bamfield, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.1			2.1	2.3	4.0	1.6	1.5	2.1	1.7	1.9	2.9
2	2.2			2.0	2.2	3.5	1.7	1.5	2.6	1.7	1.9	3.5
3	2.4			2.0	2.2	3.3	1.7	1.6	3.0	1.7	2.0	3.6
4				2.2	2.2	3.2	1.8	1.6	2.8	1.8	1.9	3.4
5				3.2	2.1	3.0	2.0	1.7	2.7	1.8	1.9	3.2
6			3.3	4.2	2.1	2.8	1.9	1.6	2.5	1.7	2.0	3.1
7		3.4		4.6	2.1	2.8	2.0	1.6	2.2	1.7	2.2	3.0
8				4.5	2.0	2.6	2.1	1.7	2.1	1.6	2.4	3.0
9				4.0	2.0	2.5	2.0	1.8	2.0	1.6	2.3	3.0
10	4.1			3.7	2.0	2.4	1.9	1.8	2.1	1.7	2.2	3.1
11				3.5	1.9	2.4	1.9	2.0	2.1	1.8	2.1	2.9
12				3.5	2.4	2.4	1.8	2.0	2.0	2.1	2.0	2.6
13			3.4	3.4	2.6	2.4	1.7	1.9	2.0	2.4	2.6	2.9
14		3.3		3.5	2.8	2.3	1.9	1.7	1.9	2.3	3.6	2.6
15				3.6	2.4	2.2	2.2	1.6	2.1	2.1	3.3	2.3
16				3.5	2.3	2.2	2.4	1.5	2.2	2.0	3.4	2.2
17	3.2			3.5	2.6	2.0	2.0	1.5	2.4	1.9	3.4	2.3
18			2.6	3.3	2.5	2.0	1.9	1.8	2.4	1.9	2.2	2.3
19			2.5	3.1	2.4	2.0	1.8	2.0	2.3	1.9	2.8	2.1
20			2.4	2.9	2.9	2.0	1.7	2.0	2.3	1.8	2.5	2.1
21		3.2	2.2	2.9	3.8	1.9	1.6	1.9	2.2	1.8	2.4	2.1
22			1.9	2.7	3.9	1.9	1.5	2.0	2.1	1.8	2.5	2.1
23			2.0	2.8	4.3	1.8	1.5	2.0	2.1	2.0	2.6	2.1
24	3.2		1.9	2.7	4.6	1.8	1.6	2.0	2.0	2.0	2.7	2.1
25			1.8	2.8	4.0	1.8	1.8	1.9	2.0	2.0	2.7	2.1
26			1.7	2.6	3.8	1.7	1.7	1.9	2.0	1.9	2.6	2.1
27			1.7	2.5	3.7	1.7	1.7	1.8	1.9	1.8	2.6	2.0
28		3.5	1.8	2.4	3.9	1.7	1.5	1.8	1.8	1.8	2.5	2.0
29			1.9	2.4	4.8	1.6	1.5	2.0	1.8	1.9	2.6	2.0
30			2.1	2.3	5.2	1.6	1.5	2.0	1.7	1.9	2.6	2.0
31	3.4		2.3		4.5		1.5	2.0		1.9		2.0

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 17; anchor ice in the river Dec. 9 and probably at other times during December.

TITTABAWASSEE RIVER AT FREELAND, MICH.

Location.—At the highway bridge at Freeland, Mich.

Records available.—August 22, 1903, to August 3, 1906; October 28, 1906, to December 31, 1909; January 1 to December 31, 1912.

Drainage area.—2,550 square miles.

Cooperation.—Data for 1912 were collected and furnished by G. S. Williams, consulting engineer, Ann Arbor, Mich.

Daily discharge, in second-feet, of Tittabawassee River at Freeland, Mich., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,300	1,290	1,455	23,600	3,800	9,450	1,380	1,373	1,380	1,180	1,920	2,190
2	2,160	1,260	1,465	22,900	3,600	8,450	1,410	1,540	1,380	1,250	2,170	2,250
3	1,960	1,240	1,480	21,900	3,600	6,600	1,390	1,000	2,070	1,520	3,850	3,120
4	1,805	1,260	1,500	17,450	3,150	5,380	1,375	1,065	2,840	2,020	4,150	5,000
5	1,755	1,275	1,515	15,400	2,940	4,250	1,370	1,190	2,070	2,560	4,060	2,770
6	1,680	1,300	1,530	19,000	2,740	4,050	1,370	1,450	1,750	2,950	3,870	7,500
7	1,640	1,300	1,555	22,400	2,570	3,680	1,370	1,600	1,600	3,500	3,700	5,820
8	1,620	1,390	1,580	21,400	2,400	3,290	1,375	1,980	1,550	3,680	3,600	4,550
9	1,620	1,300	1,595	17,450	2,240	2,940	1,370	2,400	1,510	3,900	4,070	4,470
10	1,615	1,300	1,595	12,100	2,070	2,400	1,370	2,420	1,260	4,250	5,180	3,700
11	1,595	1,310	1,585	9,450	2,065	2,270	1,375	2,650	1,060	3,880	5,620	3,960
12	1,570	1,330	1,560	8,700	2,740	2,250	1,400	2,400	930	3,500	7,850	3,500
13	1,520	1,345	1,550	8,100	4,550	2,250	1,420	2,080	1,110	2,940	9,300	3,340
14	1,500	1,315	1,545	6,800	7,250	2,235	1,415	1,700	1,380	2,760	8,800	3,120
15	1,480	1,300	1,545	7,250	7,400	2,190	1,440	1,350	1,600	2,400	8,500	3,020
16	1,480	1,300	1,540	8,150	6,380	2,150	1,460	1,200	1,840	2,080	7,400	2,940
17	1,485	1,300	1,530	7,960	6,380	2,070	1,540	1,175	2,000	1,940	5,620	2,920
18	1,480	1,315	1,550	7,500	7,760	1,920	1,535	1,150	2,070	1,770	4,620	2,890
19	1,455	1,315	1,760	7,050	6,380	1,860	1,600	1,180	2,250	1,600	4,350	2,940
20	1,435	1,330	2,150	7,050	6,150	1,700	1,680	1,240	2,400	1,600	3,880	3,010
21	1,390	1,345	2,460	6,870	21,400	1,630	1,820	1,350	2,750	1,830	3,500	3,000
22	1,360	1,365	2,620	6,140	32,400	1,600	2,070	1,300	2,780	1,920	3,300	2,900
23	1,340	1,390	2,770	5,490	32,000	1,600	2,480	1,280	2,760	2,070	3,120	2,840
24	1,305	1,410	2,770	5,080	27,000	1,525	3,600	1,240	2,400	2,250	2,920	2,690
25	1,300	1,435	2,890	4,600	20,900	1,520	4,550	1,220	1,970	2,240	2,680	2,600
26	1,300	1,425	3,230	4,550	15,400	1,470	4,660	1,200	1,940	2,000	2,520	2,520
27	1,300	1,450	3,680	4,460	8,830	1,445	4,570	1,240	1,760	1,700	2,400	2,400
28	1,340	1,450	4,150	4,250	8,920	1,410	4,350	1,280	1,600	1,670	2,330	2,250
29	1,295	1,440	4,500	4,060	10,450	1,390	3,470	1,300	1,450	1,600	2,240	2,160
30	1,295	....	13,600	3,950	12,100	1,375	2,500	1,350	1,300	1,540	2,190	2,040
31	1,295	....	18,800	....	10,200	....	2,080	1,360	....	1,520	....	1,800

Monthly discharge of Tittabawassee River at Freeland, Mich., for 1912.

[Drainage area, 2,550 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,300	1,300	1,540	0.604	0.70
February	1,450	1,240	1,340	.525	.57
March	18,800	1,460	3,000	1.18	1.36
April	23,600	3,950	10,700	4.20	4.69
May	32,400	2,060	9,220	3.62	4.17
June	9,450	1,380	2,880	1.13	1.26
July	4,660	1,370	2,090	.820	.95
August	2,650	1,000	1,490	.584	.67
September	2,840	930	1,830	.718	.80
October	4,250	1,180	2,310	.906	1.04
November	9,300	1,920	4,320	1.69	1.89
December	7,500	1,800	3,230	1.27	1.46
The year	32,400	930	3,660	1.44	19.61

HURON RIVER AT DEXTER, MICH.

Location.—At the highway bridge at Dexter, Mich., one-fourth mile below the mouth of Mill Creek.

Records available.—September 1, 1904, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain, attached to bridge; installed March 26, 1908, at the same datum as the staff gage which was in use until March 12, 1908, when it was carried out by ice; datum unchanged.

Channel.—The high water that carried out the gage produced permanent change in the bed of the river; a small headrace runs to an abandoned mill on the left bank, but at ordinary stages little or no water flows into this canal; at high stages a small amount of water may pass around the gage through this race.

Discharge measurements.—Made from a boat several hundred feet below the gage or from the bridge to which the gage is attached.

Winter flow.—As the current is swift, little ice forms at this section.

Accuracy.—Relation between gage height and discharge that existed prior to March 12, 1908, was altered as the result of the change in the river bed produced at that time; gage heights are only slightly affected by ice. The station was inspected September 23, 1912, when the chain was found to be 0.13 too long. It was correct on October 17, 1908. Gage readings published for 1909, 1910, and 1911 should be corrected on account of this elongation of the chain.

Cooperation.—Station maintained in cooperation with the Eastern Michigan Edison Co., Washtenaw division, Ann Arbor, Mich.

The following discharge measurement was made by P. S. Monk:

September 23, 1912: Gage height, 0.05 feet; discharge, 265 second-feet.

Daily gage height, in feet, of Huron River at Dexter, Mich., for 1912.

[D. M. Litchfield, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.22	0.6	1.2	3.5	1.4	0.42	−0.20	−0.12	−0.30	−0.05	0.38	0.22
2	.5	.6	1.2	3.4	1.2	.40	− .20	− .18	− .35	− .08	.6	.25
3	.48	.6	1.0	3.2	1.1	.38	− .40	− .20	− .30	− .10	.6	.30
4	.5	.6	1.0	3.8	.8	.5	− .42	− .20	− .32	− .10	.5	.28
5	.7	.6	1.0	4.3	.7	.42	− .40	− .05	− .28	− .10	.5	.28
6	1.5	.6	1.0	4.4	.6	.38	− .40	− .18	− .25	− .10	.6	.28
7	1.6	.6	.8	4.4	.6	.30	− .38	− .20	− .25	− .05	1.0	.22
8	1.6	.6	.8	4.4	.5	.30	− .40	− .18	− .30	− .02	1.0	.20
9	1.9	.6	.6	4.2	.48	.30	− .50	− .15	− .25	.00	.9	.20
10	2.0	.5	.5	3.9	.35	.22	− .45	− .18	− .28	.02	.75	.15
11	1.9	.38	.6	3.6	.32	.20	− .48	− .10	− .30	.12	.7	.15
12	2.0	.40	.6	3.2	.48	.18	− .48	− .18	− .30	.10	.6	.18
13	1.6	.30	.5	3.0	.65	− .08	− .42	− .10	− .30	.18	.6	.28
14	1.25	.30	.5	2.8	.95	− .10	− .40	− .15	− .32	.12	.6	.12
15	1.1	.32	.8	2.5	.85	− .08	− .40	− .20	− .10	.10	.6	.10
16	1.05	.32	1.0	2.2	1.1	− .02	− .20	− .22	− .10	.10	.5	.10
17	.8	.30	1.05	2.0	1.2	− .10	− .25	− .30	− .08	.12	.5	.10
18	.7	.40	1.5	2.0	1.05	− .10	− .25	− .30	.08	.18	.45	.10
19	.6	.40	3.2	2.0	.9	− .10	− .10	− .15	.05	.20	.42	.05
20	.5	.48	4.3	1.8	.9	− .10	− .15	− .10	.02	.18	.38	.00
21	.38	.5	3.8	1.6	.85	− .10	− .12	− .15	.02	.15	.38	− .02
22	.40	1.0	3.7	1.6	.9	− .10	− .20	− .20	.08	.20	.38	.25
23	.40	1.15	3.0	1.5	.7	− .20	− .40	− .28	.08	.22	.30	.28
24	.45	1.1	2.4	1.6	.65	− .22	− .30	− .30	.0	.20	.30	.00
25	.40	1.0	1.9	1.4	.6	− .30	− .30	− .10	.0	.15	.30	− .05
26	.40	1.15	1.8	1.25	.5	− .10	− .30	− .10	− .02	.12	.30	.00
27	.45	1.15	1.9	1.1	.40	− .08	− .32	− .08	− .05	.12	.30	.00
28	.40	1.2	2.1	1.05	.42	− .12	− .25	− .05	− .10	.12	.30	.02
29	.40	1.2	2.8	1.2	.5	− .18	− .15	− .10	.0	.10	.25	.00
30	.40	....	2.9	1.5	.42	− .18	− .12	− .10	.0	.12	.20	.00
31	.40	....	3.1	....	.40	....	− .10	− .10	....	.15	....	.02

NOTE.—Relation of gage height to discharge affected by ice Jan. 5 to Mar. 25. Ice 0.4 to 0.5 foot thick; many ice jams during this period. Gage heights to top of ice Feb. 22, 28, 29 and Mar. 1–5.

HURON RIVER AT GEDDES, MICH.

Location.—At dam and power plant of the Eastern Michigan Edison Co. at Geddes, Mich., half a mile above mouth of Fleming Creek.

Records available.—February 1, 1904, to December 31, 1912.

Drainage area.—757 square miles.

Determination of discharge.—The flow of the river at this point is computed from records of the operation of the power plant and records of the depth of the flow over the dam.

Cooperation.—The estimates are made and furnished by G. S. Williams, consulting engineer, Ann Arbor, Mich.

Daily discharge, in second-feet, of Huron River at Geddes, Mich., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	420	213	245	2,527	855	462	144	254	235	353	631	529
2	282	197	244	2,278	757	410	87	255	275	337	899	567
3	287	216	246	2,100	715	440	82	226	368	335	889	572
4	268	178	242	2,128	661	401	90	144	259	350	886	560
5	270	220	248	2,576	689	392	94	210	293	343	748	453
6	310	204	255	2,616	593	397	85	157	304	368	893	614
7	331	208	247	2,674	576	358	45	157	334	360	1,075	589
8	309	198	253	2,560	536	332	97	167	302	327	972	598
9	264	209	251	2,451	556	240	86	247	327	372	1,022	600
10	290	217	280	2,433	470	306	101	237	296	402	943	465
11	286	202	253	2,151	425	259	86	239	316	432	836	514
12	270	272	276	2,005	457	262	91	270	307	470	821	337
13	269	211	250	1,920	583	240	94	409	286	523	868	377
14	200	197	294	1,849	639	228	66	370	288	529	825	441
15	214	202	281	1,737	591	232	102	307	334	447	869	467
16	219	199	242	1,518	694	161	90	338	315	442	800	564
17	216	205	370	1,503	724	265	93	273	342	413	874	435
18	235	207	853	1,505	679	218	84	210	385	460	797	371
19	237	246	2,078	1,443	700	205	105	451	398	416	756	321
20	228	296	2,030	1,273	662	190	124	253	403	478	718	336
21	220	311	1,384	1,070	640	184	90	424	376	511	698	384
22	217	222	1,218	1,154	1,124	182	112	316	504	501	668	240
23	218	221	1,156	1,036	697	139	94	299	481	488	634	485
24	232	232	1,297	877	603	183	146	269	413	542	617	404
25	214	239	1,208	875	534	150	145	230	392	534	660	217
26	222	246	1,218	819	543	136	150	349	400	493	437	427
27	217	241	1,433	693	488	113	148	256	386	442	506	506
28	206	253	1,542	589	510	141	124	344	382	446	626	641
29	200	240	1,672	723	495	128	215	294	429	430	514	391
30	212	....	2,065	955	354	94	264	334	422	417	498	572
31	211	....	2,277	....	478	....	226	272	....	384	....	460

Monthly discharge of Huron River at Geddes, Mich., for 1912.

[Drainage area, 757 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	420	200	251	0.332	0.38
February	311	178	224	.296	.32
March	2,280	242	835	1.10	1.27
April	2,670	589	1,670	2.21	2.47
May	1,120	354	614	.811	.94
June	462	94	248	.328	.37
July	264	45	115	.152	.18
August	451	144	276	.365	.42
September	504	235	352	.465	.52
October	542	327	430	.568	.65
November	1,080	437	766	1.01	1.13
December	641	217	466	.616	.71
The year	2,280	45	519	.686	9.36

HURON RIVER AT FLAT ROCK, MICH.

Location.—At the highway bridge at Flat Rock, Mich., 2,000 feet below the crossing of the Detroit, Toledo & Ironton Railroad.

Records available.—August 6, 1904, to December 31, 1911.

Drainage area.—1,000 square miles.

Gage.—Staff; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from downstream side of bridge.

Artificial control.—At ordinary stages the flow of the river is controlled by a dam and power plant immediately above the station, but the operation of this plant is assumed to have little effect on the diurnal fluctuations of stage.

Winter flow.—Ice jams form below the station and cause backwater at the gage; in general the section above the station is kept open by the power plant.

Accuracy.—Station was inspected September 25, 1912; a measurement on this date indicates a marked change in the relation between gage height and discharge since October 16, 1908.

Cooperation.—Station maintained in cooperation with the Eastern Michigan Edison Co., Washtenaw division, Ann Arbor, Mich.

The following discharge measurement was made by P. S. Monk:

September 25, 1912: Gage height, 175 feet; discharge, 302 second-feet.

Daily gage height, in feet, of Huron River at Flat Rock, Mich., for 1912.

[C. L. Metler, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	2.4	3.2	8.4	4.6	2.7	0.7	1.3	1.1	1.7	2.0	2.0
2	2.9	2.4	3.1	8.3	4.2	2.5	.7	1.5	1.1	1.6	2.5	2.0
3	2.4	2.4	3.1	8.1	4.2	2.2	1.0	1.4	.6	1.6	2.6	2.3
4	2.8	2.2	2.9	7.8	3.8	2.5	.8	1.2	.85	1.6	3.0	2.3
5	2.9	2.3	3.0	8.0	3.6	2.2	.6	.8	1.3	1.4	3.2	2.5
6	2.9	2.5	3.0	8.3	3.2	2.1	.5	1.1	1.1	1.4	3.8	2.5
7	3.0	2.6	3.0	8.3	3.3	2.0	.6	1.3	.9	1.15	4.4	2.5
8	2.8	2.4	2.8	8.3	3.3	1.9	.6	1.15	1.0	1.5	4.5	2.5
9	3.8	2.2	2.8	8.3	3.0	1.7	.5	.75	.95	1.5	4.3	2.0
10	3.6	2.5	2.9	8.0	2.8	1.6	.9	.9	.8	1.4	3.9	2.3
11	3.2	2.2	2.6	8.0	2.5	1.6	.9	1.0	1.1	1.6	3.5	2.5
12	3.0	2.2	3.0	7.6	2.3	1.6	.8	1.05	1.0	1.6	3.6	2.2
13	3.0	2.0	3.0	7.4	3.6	1.4	.8	1.25	1.0	1.6	3.2	2.4
14	2.6	2.5	3.0	7.2	3.6	1.5	.7	1.7	1.1	1.7	3.2	2.1
15	2.4	2.4	3.2	7.0	3.8	1.6	.7	1.3	1.0	2.0	3.2	2.2
16	2.4	2.4	3.1	6.8	4.0	1.6	.85	1.45	1.0	1.9	3.0	2.0
17	2.4	2.4	3.0	6.6	4.6	1.5	1.0	1.1	.8	1.9	2.8	2.0
18	2.6	2.4	4.0	6.4	4.6	1.8	.8	1.1	1.2	1.8	2.5	2.0
19	2.6	2.3	7.0	6.2	3.0	1.5	.8	.95	1.2	1.8	2.5	2.0
20	2.6	2.4	8.2	6.0	3.6	1.5	.75	1.8	1.3	1.8	2.3	1.8
21	2.5	3.3	9.6	5.8	3.6	1.4	.85	1.7	1.6	1.6	2.5	1.5
22	2.4	3.4	....	5.8	4.4	1.3	1.1	1.7	1.6	2.4	2.5	1.9
23	2.4	3.1	....	5.8	4.7	.9	.7	1.7	1.8	2.2	2.3	2.0
24	2.4	3.0	9.4	5.4	3.9	.75	1.25	1.35	2.0	2.2	2.3	2.0
25	2.2	3.2	8.6	5.1	3.4	1.1	.95	1.2	1.8	2.3	2.0	2.0
26	2.4	3.6	8.2	4.8	2.8	1.2	1.05	.95	1.8	2.1	2.5	1.8
27	2.4	3.4	8.3	4.4	2.8	.9	.9	.65	1.7	1.9	2.2	1.7
28	2.2	3.4	8.3	4.1	3.0	.7	.8	1.2	1.7	1.4	2.0	1.8
29	2.2	3.3	8.7	3.8	2.8	.7	.95	1.25	1.5	2.0	1.8	1.9
30	2.5	....	8.6	4.2	2.8	.7	1.4	1.1	1.4	1.9	2.3	1.9
31	2.4	....	....	....	2.7	....	1.3	1.1	....	1.9	....	2.4

NOTE.—River frozen over from the first part of January to Mar. 20; heavy ice jam Mar. 21 to 24. Gage was taken out by ice Mar. 24, and was replaced a short time afterwards. During the interval readings were made on a temporary gage. No information regarding ice in December.

STREAM TRIBUTARY TO LAKE ERIE.

CATTARAUGUS CREEK AT VERSAILLES, N. Y.

Location.—On a three-span highway bridge in the village of Versailles, about 6 miles below Gowanda, 2½ miles above the mouth of Clear Creek (coming in from the right) and about 8 miles above the mouth of the stream.

Records available.—September 23, 1910, to December 31, 1912. Data published also in annual reports of the State Water Supply Commission of New York, New York State Conservation Commission, and New York State engineer and surveyor.

Drainage area.—467 square miles.

Gage.—Chain, fastened to the upstream side of the first span from the right-hand end of the bridge; read twice daily; datum unchanged.

Channel.—Rock and gravel; considered permanent.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Relation of gage height to discharge somewhat affected by ice.

Accuracy.—Discharge rating curve well defined; data as published are good.

Discharge measurements of Cattaraugus Creek at Versailles, N. Y., in 1912.

Date.		Hydrographer.	Gage height.	Discharge.
			Feet.	*Sec.-ft.*
Feb.	16[a]	C. S. De Golyer	6.36	256
Mar.	26	G. H. Canfield	5.75	727
	27	.....do	6.09	1,125
	27	.....do	5.79	782
	28	.....do	6.47	1,760
	30	.....do	7.57	4,610
July	12	Frank Weber	5.20	279

[a] Measurement under complete ice cover.

Daily gage height, in feet, of Cattaraugus Creek at Versailles, N. Y., for 1912.

[James A. Palmer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	6.95	7.85	8.9	6.35	5.25	4.90	5.10	7.7	5.65	5.08	5.58
2	6.1	7.0	7.15	8.5	5.95	5.22	4.88	5.02	6.6	5.42	5.00	7.15
3	5.85	6.85	7.1	6.95	5.85	5.45	4.92	5.12	5.70	5.28	5.45	7.2
4	5.63	6.85	7.1	6.7	5.75	5.25	5.25	5.10	5.38	5.18	5.48	6.4
5	5.50	6.85	7.0	7.4	5.70	5.22	5.32	5.05	5.30	5.10	5.45	5.95
6	5.47	6.85	7.05	8.0	5.78	5.12	5.12	4.92	5.22	5.12	5.42	7.25
7	5.43	6.85	7.0	8.3	6.3	5.12	5.10	4.90	5.20	5.08	5.60	6.3
8	5.47	6.85	6.9	7.1	6.15	5.12	4.96	4.98	5.12	5.05	6.15	6.05
9	5.97	6.85	7.0	6.5	5.95	5.10	4.95	4.92	5.05	5.08	5.90	5.85
10	6.45	6.85	6.9	5.9	5.75	5.08	4.90	4.98	5.00	5.15	6.05	5.48
11	6.85	6.8	6.9	5.9	5.65	5.08	5.38	5.02	5.08	5.28	5.75	5.58
12	6.9	6.75	6.95	6.8	5.45	5.08	5.25	4.98	5.12	5.15	5.58	5.35
13	6.8	6.7	6.1	6.65	5.65	5.05	5.15	5.08	5.12	5.12	5.48	5.15
14	6.85	6.65	6.9	6.4	5.78	5.06	5.25	5.08	5.02	5.12	5.65	5.68
15	6.85	6.6	7.15	6.3	5.72	5.05	5.10	5.05	5.02	5.05	5.52	5.62
16	6.8	6.6	7.2	7.1	5.88	5.08	5.45	5.88	5.22	5.02	5.52	5.62
17	7.0	6.6	7.5	6.55	6.05	5.22	5.15	5.92	5.32	5.08	5.52	5.70
18	7.2	6.65	8.0	6.0	5.85	5.12	5.02	5.92	5.30	5.05	5.48	5.90
19	7.35	6.6	7.9	5.95	5.65	5.08	5.02	5.02	5.32	5.02	5.42	6.2
20	7.45	6.75	7.8	5.92	5.58	5.05	5.05	5.08	5.20	5.08	5.50	5.75
21	......	6.9	6.75	5.95	5.58	4.98	5.25	4.95	5.05	5.02	5.42	5.58
22	......	6.8	6.35	6.0	5.52	5.00	5.12	4.92	5.08	5.18	5.45	5.42
23	......	6.7	6.05	6.3	5.45	5.02	5.02	5.05	5.15	7.4	5.38	5.32
24	......	6.8	6.05	6.1	5.42	5.05	4.98	5.08	5.38	6.25	5.35	5.25
25	......	7.0	5.9	6.1	5.32	5.02	5.02	4.98	5.25	6.45	5.38	5.22
26	......	7.2	5.7	6.05	5.32	5.05	5.08	5.08	5.12	6.15	5.40	5.12
27	......	7.8	6.05	6.0	5.28	5.02	5.08	5.32	5.02	5.75	5.48	5.18
28	7.05	7.7	6.5	5.8	5.20	5.02	5.0	5.38	5.02	5.55	5.48	5.22
29	7.15	7.6	8.8	7.35	5.25	5.02	4.98	5.35	5.02	5.35	5.52	5.32
30	7.05	......	7.5	7.0	5.22	4.95	5.0	5.12	5.02	5.32	5.58	6.95
31	6.95	......	7.4	......	5.38	......	5.02	6.1	......	5.22	......	6.45

Note.—Relation of gage height to discharge affected by ice Jan. 8 to Mar. 14.

Daily discharge, in second-feet, of Cattaraugus Creek at Versailles, N. Y., for 1910–1912.

Day.	Sept.	Oct.	Nov.	Dec.
1910.				
1	......	166	1,720	1,720
2	......	111	1,920	1,630
3	......	85	1,230	1,230
4	......	166	772	968
5	......	143	586	907
6	......	257	586	666
7	......	1,230	686	686
8	......	539	708	636
9	......	313	772	586
10	......	271	5,060	708
11	......	245	3,780	686
12	......	207	1,820	626
13	......	183	1,460	539
14	......	183	1,380	636
15	......	183	1,300	586
16	......	183	1,300	448
17	......	149	1,160	586
18	......	166	1,030	586
19	......	149	1,010	817
20	......	149	907	794
21	......	137	817	708
22	......	606	794	606
23	166	740	850	686
24	143	405	2,230	705
25	189	475	2,820	686
26	166	850	1,920	740
27	166	539	1,300	686
28	166	1,630	1,300	686
29	166	1,460	2,230	2,940
30	166	1,300	1,630	3,780
31	......	1,160	......	1,630

Daily discharge, in second-feet, of Cattaraugus Creek at Versailles, N. Y., for 1910–1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	1,820	1,030	1,030	850	2,570	327	245	137	636	1,030	794	1,820
2	6,190	1,010	850	850	1,820	313	183	137	539	2,340	708	1,380
3	4,250	772	686	772	1,030	327	137	166	448	1,030	586	1,230
4	1,820	1,160	567	907	772	271	137	1,100	343	1,540	511	907
5	1,310	740	448	6,460	636	327	137	686	343	1,630	492	817
6	1,010	539	539	5,060	539	327	137	567	3,070	1,230	511	794
7	1,030	492	366	6,100	511	271	271	292	3,480	968	1,030	817
8	1,030	666	539	2,020	475	257	183	708	5,060	884	1,820	1,010
9	1,460	740	606	1,630	422	271	166	366	1,230	850	907	1,380
10	6,790	636	2,450	1,460	422	257	195	327	772	740	666	2,120
11	6,790	492	1,460	1,300	475	257	207	226	686	686	686	1,820
12	4,550	492	4,080	1,230	271	257	183	195	606	708	850	1,920
13	3,480	492	1,820	968	137	257	137	195	636	606	1,160	5,960
14	3,200	636	2,450	1,030	422	257	137	195	586	511	1,160	2,940
15	3,930	1,380	2,690	1,230	389	245	111	166	586	511	1,230	3,200
16	1,540	1,160	1,820	968	389	207	111	539	586	539	1,160	2,340
17	1,100	6,100	1,460	1,010	343	195	137	366	405	539	1,030	2,120
18	884	5,400	1,030	448	366	195	327	292	422	606	7,540	1,720
19	932	2,940	794	794	666	195	183	226	405	586	2,230	1,160
20	932	1,630	932	1,030	1,160	195	327	166	405	586	1,820	850
21	1,160	1,460	1,030	1,010	405	166	271	137	343	539	1,630	884
22	1,160	1,010	1,920	1,030	343	137	245	195	343	422	1,380	1,010
23	1,030	772	2,450	850	327	226	245	207	343	606	1,300	2,690
24	586	794	1,030	817	343	226	195	207	271	636	2,340	1,300
25	686	817	817	666	366	195	195	327	475	586	1,720	1,100
26	740	1,230	1,460	606	343	207	226	366	380	606	1,380	1,030
27	1,300	2,230	4,560	539	271	389	195	448	327	567	1,160	1,630
28	5,740	1,160	3,340	539	313	636	195	2,570	343	586	1,160	932
29	2,120	....	1,630	492	292	448	207	4,400	327	475	3,070	1,720
30	1,380	....	1,460	606	271	271	195	1,300	389	405	2,230	1,100
31	1,030	....	1,160	....	271	....	137	740	....	475	....	1,030
1912.												
1	1,460	....	....	9,340	1,540	292	85	195	5,060	636	183	567
2	1,160	....	....	7,900	968	271	75	149	2,020	422	137	3,340
3	850	....	....	2,820	850	448	95	207	686	313	448	3,480
4	616	....	....	2,230	740	292	292	195	389	245	475	1,630
5	492	....	....	4,080	686	271	343	166	327	195	448	968
6	466	....	....	6,100	772	207	207	95	271	207	422	3,630
7	431	....	....	7,180	1,460	207	195	85	257	183	586	1,460
8	....	....	....	3,200	1,230	207	111	127	207	166	1,230	1,100
9	....	....	....	1,820	968	195	111	95	166	183	907	850
10	....	....	....	907	740	183	85	127	137	226	1,100	475
11	....	....	....	907	636	183	389	149	183	313	740	567
12	....	....	....	2,450	448	183	292	127	207	226	567	366
13	....	....	....	2,120	636	166	226	183	207	207	475	226
14	....	....	....	1,630	772	166	292	183	149	207	636	666
15	....	....	3,340	1,460	708	166	195	166	149	166	511	606
16	....	....	3,480	3,200	884	183	448	884	271	149	511	606
17	....	....	4,400	1,920	1,100	271	226	932	343	183	511	686
18	....	....	6,100	1,030	850	207	149	932	327	166	475	907
19	....	....	5,740	968	636	183	149	149	343	149	422	1,300
20	....	....	5,400	932	567	166	166	183	257	183	492	740
21	....	....	2,340	968	567	127	292	111	166	149	422	567
22	....	....	1,540	1,030	511	137	207	95	183	245	448	422
23	....	....	1,100	1,460	448	149	149	166	226	4,080	389	343
24	....	....	1,100	1,160	422	166	127	183	389	1,380	366	292
25	....	....	907	1,160	343	149	149	127	292	1,720	389	271
26	....	....	686	1,100	343	166	183	183	207	1,230	405	207
27	....	....	1,100	1,030	313	149	183	343	149	740	475	245
28	....	....	1,820	794	257	149	137	389	149	539	475	271
29	....	....	8,960	3,930	292	149	127	366	149	366	511	342
30	....	....	4,400	2,940	271	111	137	207	149	343	567	2,820
31	....	....	4,080	....	389	....	149	1,160	....	271	....	1,720

NOTE.—Daily discharge determined from a rating curve well defined below 2,000 second-feet. Daily discharge Jan. 1 to 5 and 10 to 12, 1911, reduced somewhat on account of ice jams. Daily discharge for other short periods during 1911 may be in error because of ice jams.

Monthly discharge of Cattaraugus Creek at Versailles, N. Y., for 1910–1912.

[Drainage area, 467 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910.						
September 23-30	189	143	166	0.356	0.11	A.
October	1,630	85	464	.994	1.15	A.
November	5,060	586	1,500	3.21	3.58	A.
December	3,780	448	964	2.06	2.38	C.
1911.						
January	....	....	1,870	4.00	4.61	D.
February	6,100	492	1,360	2.91	3.03	C.
March	4,560	366	1,530	3.28	3.78	B.
April	6,460	448	1,440	3.08	3.44	A.
May	2,570	137	560	1.20	1.38	A.
June	636	137	270	.578	.64	A.
July	327	111	189	.405	.47	A.
August	4,400	137	579	1.24	1.43	A.
September	5,060	271	826	1.77	1.98	A.
October	2,340	405	775	1.66	1.91	A.
November	7,540	492	1,480	3.17	3.54	A.
December	5,920	794	1,640	3.51	4.05	A.
The year	7,540	111	1,040	2.23	30.26	
1912.						
January	....	....	470	1.01	1.16	D.
February	....	....	290	.621	.67	D.
March	8,980	....	2,050	4.39	5.06	C.
April	9,340	794	2,590	5.55	6.19	A.
May	1,540	257	689	1.48	1.71	A.
June	448	111	197	.422	.47	A.
July	448	75	193	.413	.48	A.
August	1,160	85	279	.597	.69	A.
September	5,060	137	467	1.00	1.12	A.
October	4,080	149	509	1.09	1.26	A.
November	1,100	137	524	1.12	1.25	A.
December	3,630	207	1,020	2.18	2.51	A.
The year	9,340	75	747	1.66	22.57	

NOTE.—Discharge Jan. 8 to Mar. 14, 1912, estimated by means of comparison with adjacent stations.
Mean discharge Jan. 8–31 estimated 380 second-feet.
Mean discharge Mar. 1–14 estimated 500 second-feet.

STREAMS TRIBUTARY TO LAKE ONTARIO.

LITTLE TONAWANDA CREEK AT LINDEN, N. Y.

Location.—At the stone-arch highway bridge in the village of Linden, 600 feet northeast of the Erie Railroad station and 3 miles above the junction with Tonawanda Creek.

Records available.—July 8 to December 31, 1912.

Drainage area.—20.7 square miles.

Gage.—Vertical staff, on the right-hand upstream abutment of the bridge; lower 2 feet enameled-iron gage, graduated to hundredths of a foot; upper 4 feet of bronze, graduated to half tenths. An auxiliary bronze gage fastened to the right-hand downstream abutment of the bridge is used to check the rating of the upper gage.

Channel.—A standard Francis weir, 2.01 feet long and 8 inches high, has been constructed under the upstream side of the bridge. When the stage gets above the depth of this weir, it flows over a 2-inch plank about 13 feet long, including the 2 feet of weir. The crest of the weir is at gage height 0.03 foot.

Discharge measurements.—Made from a cable and car 1,000 feet above the gage at high stages and by wading above the weir at low stages.

Accuracy.—At gage height 0.69 or below the flow is confined to the weir, and for such periods the accuracy of the computations will be the accuracy of any Francis weir; for stages above gage height 0.69 the weir has been rated with a current meter, and the accuracy of the data so obtained should also be excellent.

Discharge measurements of Little Tonawanda Creek at Linden, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
1912.		*Feet.*	*Sec.-ft.*
July 8	Frank Weber	(a)	1.14
Oct. 3	J. G. Mathers	0.38	1.31
3	.....do	.38	1.40
3	.....do	.38	1.37
Dec. 5	C. S. DeGolyer	1.11	17.9
5	.....do	1.08	16.5
7	.....do	1.19	24.9

a Gage not installed.

Daily gage height, in feet, of Little Tonawanda Creek at Linden, N. Y., for 1912.

[C. L. Schenck, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	0.34	0.51	0.38	0.52	0.83	16	0.48	0.24	0.39	0.30	0.88	0.84
2	......	.35	.69	.41	.50	1.43	17	.39	.24	.34	.30	.84	.86
3	......	.38	.65	.40	.50	1.79	18	.36	.38	.37	.30	.82	.90
4	......	.34	.55	.39	.46	1.30	19	.35	.33	.40	.32	.80	1.00
5	......	.32	.48	.35	.45	1.14	20	.34	.32	.50	.30	.80	.87
6	......	.31	.44	.33	.44	1.44	21	.37	.36	.40	.30	.76	.88
7	......	.30	.40	.32	.52	1.20	22	.40	.40	.36	.28	.74	.86
8	......	.30	.38	.31	.90	1.02	23	.36	.92	.40	.42	.72	.86
9	......	.30	.38	.31	.98	.92	24	.34	.96	.46	.69	.72	.88
10	0.44	.30	.34	.34	.90	1.02	25	.33	.79	.52	.86	.82	.87
11	.39	.30	.34	.34	.82	.94	26	.33	.72	.43	.84	.78	.86
12	.36	.30	.34	.32	.78	.88	27	.30	.70	.39	.78	.84	.89
13	.35	.28	.32	.32	.75	.84	28	.30	.62	.38	.72	.80	.80
14	.54	.28	.31	.31	.95	.82	29	.46	.58	.36	.66	.84	.88
15	.39	.26	.32	.31	.88	.83	30	.35	.52	.36	.60	.85	.94
							31	.34	.47	......	.54	......	1.29

NOTE.—To reduce gage heights to heads on the weir, subtract 0.03 foot.

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Daily discharge, in second-feet, of Little Tonawanda Creek at Linden, N. Y., for 1912.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	1.12	2.12	1.34	2.18	6.3	16	1.93	0.63	1.39	0.91	7.8	6.6
2	......	1.17	3.36	1.51	2.05	37.4	17	1.39	.63	1.12	.91	6.6	7.2
3	......	1.34	3.07	1.45	2.05	66.2	18	1.23	1.34	1.28	.91	6.0	8.4
4	......	1.12	2.38	1.39	1.81	27.5	19	1.17	1.07	1.45	1.01	5.5	12.0
5	......	1.01	1.93	1.17	1.74	18.1	20	1.12	1.01	2.05	.91	5.5	7.5
6	......	.96	1.68	1.07	1.68	38.2	21	1.28	1.23	1.45	.91	4.6	7.8
7	......	.91	1.45	1.01	2.18	21.2	22	1.45	35.0	1.23	.82	4.2	7.2
8	1.14	.91	1.34	.96	8.4	12.8	23	1.23	9.1	1.45	1.56	3.8	7.2
9	......	.91	1.34	.96	11.2	9.1	24	1.12	10.5	1.81	3.36	3.8	7.8
10	1.68	.91	1.12	1.12	8.4	12.8	25	1.07	5.2	2.18	7.2	6.0	7.5
11	1.39	.91	1.12	1.12	6.0	9.8	26	1.07	3.8	1.62	6.6	5.0	7.2
12	1.23	.91	1.12	1.01	5.0	7.8	27	.91	3.48	1.39	5.0	6.6	8.1
13	1.17	.82	1.01	1.01	4.4	6.6	28	.91	2.86	1.34	3.8	5.5	5.5
14	2.32	.82	.96	.96	10.1	6.0	29	1.81	2.58	1.23	3.14	6.6	7.8
15	1.39	.72	1.01	.96	7.8	6.3	30	1.17	2.18	1.23	2.72	6.9	9.8
							31	1.12	1.87	......	2.32	......	25.4

NOTE.—Daily discharge determined from a rating curve based on the Francis weir formula. Above gage height 0.69 foot the entire length of the wooden dam is considered as a weir. The discharge measurements that have been made check the curve quite closely.

Monthly discharge of Little Tonawanda Creek at Linden, N. Y., for 1912.

[Drainage area, 22 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Millions of gallons.	
July 10-31	2.32	0.91	1.33	0.060	0.05	18.9	A.
August	35.0	.63	3.09	.140	.16	60.9	A.
September	3.36	.96	1.57	.071	.08	30.4	A.
October	7.2	.82	1.91	.087	.10	38.3	A.
November	11.2	1.68	5.31	.241	.27	103.	A.
December	66.2	5.5	13.8	.627	.72	276.	A.

GENESEE RIVER AND TRIBUTARIES.

GENESEE RIVER AT ST. HELENA, N. Y.

Location.—At the steel highway bridge about 6 miles above the mouth of Silver Lake outlet (coming in from the left), 9½ miles above Canaseraga Creek (coming in from the right), and 5½ miles below the village of Portageville and the site of the proposed storage dam of the State of New York Conservation Commission.

Records available.—August 14, 1908, to December 31, 1912. Published also in annual reports of the State Water Supply Commission of New York, 1910, the New York State engineer and surveyor, and the Conservation Commission of New York.

Drainage area.—1,030 square miles.

Gage.—Chain, fastened to the upstream side of the bridge, middle span; read twice daily; datum unchanged. Since August 24, 1911, a Gurley automatic water-stage register with intake pipe to the well a few feet downstream from the chain gage; datum same as chain gage, but slope of water surface makes readings different.

Channel.—Gravel and rocks; fairly permanent.

Discharge measurements.—At high stages made from the bridge; at low stages, by wading near the bridge.

Winter flow.—Relation between gage height and discharge usually but slightly affected by ice; determination of winter discharge considered good.

Accuracy.—Discharge rating curve is well defined and data as published are considered excellent.

Discharge measurements of Genesee River at St. Helena, N. Y., in 1912.

Date.	Hydrographer.	Gage height.		Discharge.
		Chain.	Recording.	
		Feet.	*Feet.*	*Sec.-ft.*
Jan. 4[a]	C. S. De Golyer	2.78	2.72	502
4	.....do	2.63	2.58	480
Feb. 17[b]	.....do	3.32	3.29	211
Mar. 10[b]	G. H. Canfield	4.54	4.47	740
22	.....do	4.44	4.38	2,470
22	.....do	4.41	4.31	2,440
June 16[c]	Frank Weber	2.02	2.01	196
Oct. 25	C. S. De Golyer	3.34	3.24	954
25	.....do	3.52	3.40	1,130
29[c]	.....do	2.84	2.77	552

[a] Some slush ice and ice near shore.

[b] Measurements made under complete ice cover.

[c] Measurements made by wading.

Daily gage height, in feet, from automatic and chain gages, of Genesee River at St. Helena, N. Y., for 1912.

[Herman Piper, observer.]

Day.	January.		February.		March.		April.		May.		June.	
	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.
1	......	3.2	3.34	2.6	4.50	4.9	8.55	8.6	4.75	5.0	2.56	2.6
2	......	3.0	3.33	2.7	4.28	4.6	8.13	8.6	4.14	4.2	2.46	2.5
3	......	2.9	3.32	2.65	4.14	4.4	6.54	6.4	3.82	3.9	2.53	2.55
4	2.71	2.65	3.29	2.6	4.05	4.3	5.38	5.4	3.58	3.7	2.72	2.8
5	2.59	2.55	3.30	2.5	3.99	4.2	6.30	6.6	3.38	3.45	2.48	2.55
6	2.39	2.46	3.31	2.45	3.93	4.2	2.62	7.4	3.34	3.4	2.38	2.48
7	2.47	2.7	3.28	2.5	3.89	4.2	7.39	7.4	3.40	3.55	2.33	2.44
8	2.80	2.75	3.29	2.45	3.93	4.2	6.80	6.9	3.26	3.4	2.28	2.39
9	2.82	2.46	3.28	2.5	4.08	4.2	5.36	5.4	3.12	3.15	2.21	2.24
10	2.70	2.65	3.28	2.45	4.48	4.6	5.28	5.4	3.11	3.2	2.20	2.20
11	2.74	2.8	3.28	2.4	4.48	4.5	4.67	4.7	3.02	3.1	2.13	2.10
12	2.83	2.9	......	2.5	4.33	4.4	4.64	4.7	2.86	2.95	2.12	2.08
13	2.85	2.8	......	2.85	4.27	4.3	5.54	5.6	3.04	3.1	1.99	2.04
14	2.85	2.7	......	2.8	4.18	4.2	4.77	4.8	3.16	3.25	2.10	2.16
15	2.89	2.8	......	3.0	4.22	4.2	4.96	5.7	3.07	3.1	2.06	2.14
16	3.23	2.9	......	2.7	5.92	5.9	4.95	5.0	3.79	3.7	2.04	2.16
17	3.42	2.85	......	3.25	6.32	6.5	4.37	4.4	5.74	5.9	2.09	2.11
18	3.37	2.9	3.31	3.15	7.17	7.3	4.09	4.2	4.56	4.7	2.06	2.08
19	3.49	3.0	3.35	3.35	7.11	7.0	3.99	4.1	3.95	4.0	2.04	2.09
20	4.41	4.2	3.49	3.3	7.26	7.3	3.78	3.85	3.65	3.25	2.00	2.02
21	4.36	4.1	3.67	3.4	5.38	5.4	3.58	3.65	3.42	3.5	2.05	2.04
22	4.10	3.2	4.17	4.3	4.39	4.4	3.48	3.55	3.38	3.55	2.00	2.04
23	3.98	2.8	4.15	4.2	4.08	4.1	3.87	3.9	3.35	3.45	1.75	1.94
24	3.86	3.5	4.20	4.3	3.93	4.2	3.90	4.0	3.06	3.2	1.99	2.02
25	3.71	3.0	4.42	4.5	3.60	3.55	3.73	3.8	2.88	3.0	1.97	2.01
26	3.61	2.8	4.45	4.6	3.38	3.4	3.44	3.55	2.76	2.8	1.96	2.00
27	3.54	2.7	4.72	4.8	3.41	3.55	3.26	3.4	2.67	2.7	1.75	1.66
28	3.46	2.65	4.95	5.1	4.20	4.7	3.14	3.2	2.57	2.65	1.75	1.74
29	3.40	2.6	4.82	5.0	7.95	8.9	4.50	4.6	2.54	2.6	1.83	1.71
30	3.40	2.7	......	......	8.35	8.2	6.50	6.5	2.57	2.6	1.70	1.71
31	3.36	2.5	......	......	7.24	6.9	......	......	2.73	2.8	......	......

Daily gage height, in feet, from automatic and chain gages, of Genesee River at St. Helena, N. Y., for 1912—Continued.

Day.	July.		August.		September.		October.		November.		December.	
	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.
1	1.74	1.61	1.68	1.65	2.20	2.16	3.37	2.9	2.45	2.5	2.53	2.6
2	1.79	1.76	1.85	1.85	3.40	3.8	4.00	4.0	2.52	2.55	2.78	2.75
3	1.82	1.72	1.88	1.82	3.45	3.5	3.26	3.3	2.61	2.7	5.42	5.6
4	1.51	1.20	1.88	1.78	3.05	3.1	2.94	3.0	2.53	2.55	4.20	4.3
5	1.79	1.82	2.02	2.09	2.67	2.75	2.78	2.8	2.46	2.49	3.71	3.9
6	1.77	1.74	1.95	2.08	2.50	2.5	2.62	2.65	2.39	2.46	4.84	5.6
7	1.52	1.46	1.86	1.89	2.54	2.6	2.52	2.55	2.50	2.46	4.42	4.5
8	1.85	1.80	1.78	1.79	2.35	2.42	2.42	2.44	4.56	4.9	3.69	3.8
9	1.76	1.79	1.76	1.86	2.25	2.21	2.38	2.44	4.03	4.4	3.17	3.2
10	1.60	1.58	1.75	1.72	2.16	2.24	2.41	2.5	4.19	4.4	3.05	3.1
11	2.01	1.85	1.52	1.52	2.07	2.10	2.83	2.8	3.71	3.9	3.10	3.25
12	2.18	2.21	1.70	1.75	2.00	2.04	2.94	3.0	3.39	3.45	2.84	2.9
13	2.16	2.22	1.83	1.86	2.07	2.12	2.66	2.7	3.18	3.3	2.55	2.65
14	2.06	2.09	1.99	2.09	1.87	1.85	2.56	2.6	3.12	3.3	2.63	2.65
15	2.05	2.08	1.87	1.84	1.82	2.14	2.41	2.5	3.08	3.25	2.70	2.7
16	......	2.02	1.79	1.71	2.41	2.21	2.31	2.35	2.96	3.05	2.77	2.75
17	......	1.84	1.72	1.65	3.06	3.1	2.26	2.29	2.86	2.9	2.73	2.75
18	1.91	1.88	1.56	1.54	2.68	2.75	2.21	2.29	2.83	2.9	2.76	2.8
19	1.86	1.82	1.91	1.96	2.58	2.65	2.20	2.31	2.78	2.9	2.94	3.05
20	1.75	1.78	1.83	1.82	2.56	2.6	2.16	2.22	2.76	2.9	3.02	3.2
21	1.57	1.54	1.84	1.85	2.44	2.48	......	2.24	2.74	2.8	2.83	2.9
22	2.01	2.09	1.83	1.92	2.29	2.34	......	2.16	2.65	2.7	2.70	2.7
23	1.82	1.82	1.84	1.85	2.26	2.32	......	3.05	2.57	2.6	2.63	2.7
24	1.82	1.85	1.83	1.84	2.30	2.36	......	3.8	2.52	2.6	2.63	2.65
25	1.73	1.68	1.75	1.78	3.03	3.15	......	3.4	2.59	2.7	2.60	2.6
26	1.85	1.81	2.02	2.00	3.21	3.35	3.59	3.65	2.64	2.7	2.55	2.65
27	2.03	2.09	2.48	2.95	2.99	2.95	3.22	3.3	2.66	2.8	2.54	2.55
28	1.88	1.80	2.85	2.9	3.04	3.15	2.91	3.0	2.65	2.7	2.40	2.45
29	2.03	2.04	2.45	2.49	2.75	2.8	2.74	2.85	2.60	2.7	2.24	2.15
30	1.91	1.91	2.29	2.35	2.86	3.0	2.60	2.8	2.58	2.7	2.65	2.7
31	1.78	1.81	2.18	2.24	......	......	2.50	2.55	......	......	3.51	3.75

NOTE.—Relation of gage height to discharge affected by ice Jan. 4 to Mar. 16. Gage heights for both chain and automatic gages presented for the purpose of comparison. The gage heights given for the automatic gage are the means of hourly readings for 24-hour periods; those for the chain gage are the means of two readings which are usually taken at 8 a. m. and 5 p. m. The readings on the two gages do not agree exactly, owing to the fact that the mouth of the intake pipe to the automatic gage is a few feet downstream from the chain gage and that the slope between the gages varies with the stage.

Daily discharge, in second-feet, from automatic and chain gages of Genesee River at St. Helena, N. Y., for 1912.

Day.	January.		February.		March.		April.		May.		June.	
	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.
1	1,070	....	340	....	785	....	17,100	15,900	3,240	3,600	432	424
2	881	....	320	....	644	....	14,900	15,900	2,150	2,100	379	377
3	789	....	300	....	570	....	8,160	7,120	1,680	1,620	416	400
4	628	....	280	....	526	....	4,680	4,470	1,360	1,340	522	530
5	536	....	280	....	498	....	7,360	7,720	1,110	1,060	390	400
6	398	....	280	....	473	....	12,400	10,400	1,060	1,010	341	368
7	400	....	240	....	456	....	11,300	10,400	1,130	1,160	319	351
8	610	....	240	....	473	....	9,040	8,660	980	1,010	298	329
9	600	....	240	....	540	....	4,630	4,470	840	785	269	270
10	470	....	240	....	772	....	4,430	4,470	830	830	265	255
11	470	....	240	....	772	....	3,080	3,000	748	740	238	219
12	500	....	240	....	674	....	3,030	3,000	620	625	234	212
13	480	....	240	....	638	....	5,100	4,940	766	740	189	199
14	460	....	230	....	590	....	3,280	3,200	880	875	227	241
15	460	....	230	....	611	....	3,680	5,190	793	740	210	233
16	670	....	230	....	3,000	....	3,660	3,600	1,640	1,340	206	241
17	770	....	231	....	7,430	7,420	2,530	2,440	5,650	5,720	224	223
18	500	....	247	....	10,400	10,000	2,080	2,100	2,870	3,000	213	212
19	750	....	259	....	10,200	8,980	1,920	1,940	1,860	1,780	206	216
20	1,450	....	301	....	10,800	10,000	1,620	1,550	1,440	875	192	193
21	1,360	....	363	....	4,680	4,470	1,360	1,280	1,150	1,110	210	199
22	1,100	....	585	....	2,560	2,440	1,230	1,160	1,110	1,160	192	199
23	960	....	575	....	2,060	1,940	1,750	1,620	1,080	1,060	119	168
24	910	....	600	....	1,840	2,100	1,790	1,780	784	830	189	193
25	700	....	733	....	1,380	1,160	1,550	1,480	635	660	182	189
26	620	....	752	....	1,110	1,010	1,180	1,160	548	530	179	186
27	550	....	934	....	1,140	1,160	980	1,010	492	474	119	95
28	480	....	1,100	....	2,250	3,000	860	830	437	449	119	114
29	420	....	1,000	....	14,000	17,500	2,760	2,810	421	424	140	106
30	400	....	....	....	16,000	13,900	8,020	7,420	437	424	106	106
31	360	....	....	....	10,700	8,660	....	....	529	530	....	....

Daily discharge, in second-feet, from automatic and chain gages of Genesee River at St. Helena, N. Y., for 1912—Continued.

Day.	July.		August.		September.		October.		November.		December.	
	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.	Auto.	Chain.
1	116	84	101	93	265	241	1,100	590	374	377	416	424
2	129	118	146	142	1,130	1,480	1,940	1,780	410	400	562	502
3	137	109	154	134	1,190	1,110	980	920	458	474	4,780	1,940
4	64	20	154	123	775	740	681	660	416	400	2,250	2,270
5	129	134	199	216	492	502	562	530	374	373	1,520	1,620
6	124	114	175	212	400	377	464	449	345	359	3,420	4,940
7	66	56	148	153	421	424	410	400	400	359	2,620	2,620
8	146	128	127	125	327	342	360	350	2,870	3,400	1,500	1,480
9	121	126	121	145	285	259	341	350	1,980	2,440	890	830
10	82	78	119	109	249	270	355	377	2,230	2,440	775	740
11	196	142	66	66	216	219	598	530	1,520	1,620	820	875
12	257	259	106	116	192	199	681	660	1,120	1,060	605	590
13	249	263	140	145	216	226	486	474	900	920	426	449
14	213	216	189	216	151	142	432	424	840	920	469	449
15	210	212	151	139	137	233	355	377	802	875	510	474
16	193	193	129	106	355	259	310	313	697	700	555	502
17	139	139	111	93	784	740	289	289	620	590	529	502
18	163	150	74	70	498	502	269	289	598	590	548	530
19	148	134	163	174	442	429	265	297	562	590	681	700
20	119	123	140	134	432	424	249	263	548	590	748	830
21	76	70	143	142	369	368	270	270	535	530	598	590
22	196	216	140	162	302	309	241	241	481	474	510	474
23	137	134	143	142	289	301	700	700	437	424	469	474
24	137	142	140	139	306	317	1,480	1,480	410	424	469	449
25	114	100	119	123	757	785	1,110	1,010	448	474	453	424
26	146	131	199	186	930	965	1,370	1,280	475	474	426	449
27	202	216	390	625	722	625	940	920	486	530	421	400
28	154	128	612	590	766	785	658	660	481	474	350	355
29	202	199	374	373	542	530	535	560	453	474	281	248
30	163	159	302	313	620	660	453	530	442	474	481	474
31	127	131	257	270	....	....	400	400	....	....	1,280	1,410

NOTE.—Daily discharge Jan. 1-3 and Mar. 17 to Dec. 31 determined from a well-defined rating curve. The same rating curve was used for both sets of gage heights by applying a well-defined table of relation. (See First Ann. Rept. New York Conservation Commission.) Discharge Jan. 4 to Mar. 16 determined by means of a rating curve based on measurements made with ice present and assuming a gradual change from open water to complete ice cover on Feb. 10. On days for which there are no automatic gage heights the chain-gage heights were used to determine discharge. Daily estimates from chain-gage readings for periods during which ice was present not published because of their lower accuracy.

Monthly discharge of Genesee River at St. Helena, N. Y., for 1912.

[Drainage area, 1,030 square miles.]

Month.	Discharge (second-feet).										Run-off (depth in inches on drainage area).
	Maximum.						Minimum.	Mean.		Per square mile.	
	Automatic gage.				Chain gage.						
	Day.	Hour.	Crest gage height.	Crest discharge.	Date.	24-hour discharge.		Automatic gage.	Chain gage.		
January........	20	12.45 p. m.	4.76	3,260	....	....	360	669	....	0.650	0.75
February.......	28	9.45 p. m..	5.03	3,840	....	....	230	409	....	.397	.43
March..........	30	1.00 a. m..	9.51	22,700	29	17,500	456	3,500	....	3.40	3.92
April...........	1	4.00 a. m..	9.26	21,200	1-2	15,900	860	4,850	4,700	4.71	5.26
May............	17	3.00 a. m..	6.25	7,200	17	5,720	421	1,270	1,250	1.23	1.42
June............	4	5.30 a. m..	2.83	598	4	530	106	244	248	.237	.26
July............	12	3.30 a. m..	2.18	257	13	263	64	150	143	.146	.17
August.........	27	5.30 p. m..	3.61	1,390	27	625	66	178	186	.173	.20
September......	2	4.30 p. m..	3.94	1,850	2	1,480	137	485	492	.471	.53
October.........	2	12.30 a. m.	4.53	2,820	2	1,780	241	622	593	.604	.70
November......	8	8.30 a. m..	4.78	3,300	8	3,400	345	757	808	.735	.82
December......	3	5.45 a. m..	5.95	6,260	3	4,940	281	979	1,030	.950	1.10
The year.	Mar. 30	1.00 a. m..	9.51	22,700	Mar. 29	17,500	64	1,180	....	1.15	15.56

Discharge for automatic gage rated as follows: Mar., B; April-June, A; July and Aug., B; Sept. to Dec., A.

GENESEE RIVER AT JONES BRIDGE, NEAR MOUNT MORRIS, N. Y.

Location.—At the highway bridge known as Jones Bridge, about 5 miles below the village of Mount Morris, 6 miles by river above the village of Geneseo, 1¾ miles below the inflow of Canaseraga Creek (coming in from the right) and about 1¾ miles above the mouth of Beads Creek (coming in from the left).

Records available.—May 22, 1903, to Apr. 30, 1906; Aug. 12, 1908, to Dec. 31, 1912. Published also in reports of State engineer and surveyor of New York, State Water Supply Commission of New York, and Conservation Commission of New York.

Drainage area.—1,410 square miles.

Gage.—Chain, fastened to upstream side of highway bridge; read twice daily; datum unchanged.

Channel.—Sandy clay; liable to shift, but measurements have shown it to be fairly permanent in recent years.

Discharge measurements.—Made at all stages from footbridge erected on the outriggers of the bridge.

Winter flow.—Relation between gage height and discharge for the winter months considerably affected by ice. Volume of flow during the winter months determined chiefly by comparison with the flow of the Genesee at Rochester and at St. Helena.

Accuracy.—Discharge curve well developed and data as published for open-water periods believed to be very good.

Discharge measurements of Genesee River at Jones Bridge, near Mount Morris, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 13[a]	G. H. Canfield	7.34	857
July 18[b]	Frank Weber	3.90	257

[a] Partly open at bridge. Control frozen.

[b] Wading under bridge.

Daily gage height, in feet, of Genesee River at Jones Bridge, near Mount Morris, N. Y., for 1912.

[J. W. Trewer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4		8.8	26.2	11.6	4.95	3.61	3.61	4.3	5.4	4.75	4.9
2	6.3		8.6	26.1	8.9	4.75	3.56	3.66	5.8	8.0	4.7	5.1
3	5.9		7.3	23.9	7.8	4.85	3.57	3.78	6.7	6.1	4.8	12.2
4	5.8		7.0	17.8	7.0	5.0	3.47	3.92	6.2	5.5	4.8	8.6
5	8.1		6.8	16.2	6.5	4.75	3.61	3.90	5.4	5.2	4.75	7.1
6			6.6	22.5	6.3	4.6	4.05	4.05	5.1	5.0	4.6	9.2
7			6.6	21.8	6.4	4.45	3.61	4.05	4.9	4.9	4.6	9.8
8			6.7	21.8	6.2	4.4	3.61	3.82	4.9	4.7	8.4	7.3
9			7.0	16.0	6.0	4.35	3.48	3.69	4.5	4.65	8.1	6.1
10			7.6	13.3	5.7	4.2	4.55	3.68	4.25	4.55	8.2	5.6
11			7.8	10.9	5.6	4.2	4.1	3.54	4.2	5.0	7.0	5.8
12			7.5	9.9	5.5	4.25	4.4	3.55	4.2	5.5	6.2	5.6
13			7.4	13.2	5.6	4.15	4.35	3.66	4.25	5.0	5.9	6.4
14			7.4	10.7	5.9	4.05	4.25	3.49	4.15	4.9	5.7	6.3
15			8.2	10.5	5.7	4.1	4.1	3.82	3.82	4.7	5.7	6.2
16			13.8	11.3	6.3	3.95	4.2	3.78	4.15	4.5	5.6	5.5
17			22.6	10.0	13.4	4.05	4.05	3.69	5.7	4.45	5.4	5.5
18			24.7	8.6	10.4	4.15	3.88	3.56	5.1	4.4	5.3	5.2
19			25.0	8.3	8.3	4.05	3.89	3.75	4.95	4.35	5.2	5.4
20			24.7	7.6	7.3	3.99	3.71	3.79	4.85	4.35	5.1	5.5
21			18.2	7.0	6.6	3.98	3.60	3.91	4.7	4.3	5.1	5.2
22			11.0	6.8	6.2	4.0	3.81	4.15	4.4	4.2	5.1	5.2
23			9.8	6.5	6.4	3.82	3.85	4.0	4.35	4.35	4.9	5.1
24			8.8	7.8	5.8	3.87	3.88	4.1	4.5	7.1	4.8	5.2
25			7.6	7.4	5.4	4.1	3.91	3.82	5.2	6.0	4.85	5.0
26			6.9	6.7	5.2	4.05	3.64	3.95	6.1	6.7	5.0	5.0
27			7.3	6.3	5.0	3.92	3.71	4.2	5.4	6.0	5.0	5.0
28		10.2	8.4	6.0	4.85	3.77	3.81	5.7	5.7	5.5	5.1	4.6
29		9.9	20.7	7.1	4.8	3.75	3.82	5.4	5.2	5.2	5.0	4.5
30			25.8	17.4	4.9	3.71	4.0	4.45	5.0	5.0	4.95	5.0
31			24.2		5.2		3.71	4.2		4.85		6.2

NOTE.—Relation of gage height to discharge affected by ice Jan. 5 to Mar. 16.

Daily discharge, in second-feet, of Genesee River at Jones Bridge, near Mount Morris, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,450	......	......	16,500	4,870	687	175	175	402	910	595	664
2	1,400	......	......	16,400	2,980	595	162	188	1,120	2,400	572	760
3	1,180	......	......	14,700	2,270	641	165	222	1,620	1,280	618	5,220
4	1,120	......	......	9,800	1,790	710	141	267	1,340	960	618	2,790
5	......	......	......	8,520	1,500	595	175	260	910	810	595	1,850
6	......	......	......	13,600	1,400	528	311	311	760	710	528	3,190
7	......	......	......	13,000	1,450	463	175	311	664	664	528	3,610
8	......	......	......	13,000	1,340	442	175	234	664	572	2,660	1,970
9	......	......	......	8,360	1,230	422	143	195	484	550	2,460	1,280
10	......	......	......	6,200	1,060	364	506	193	383	506	2,530	1,010
11	......	......	......	4,380	1,010	364	328	158	364	710	1,790	1,120
12	......	......	......	3,680	960	383	442	160	364	960	1,340	1,010
13	......	......	......	6,120	1,010	346	422	188	383	710	1,180	1,450
14	......	......	......	4,240	1,180	311	383	146	346	664	1,060	1,400
15	......	......	......	4,100	1,060	328	328	234	234	572	1,060	1,340
16	......	......	......	4,660	1,400	277	364	222	346	484	1,010	960
17	......	......	13,600	3,750	6,280	311	311	195	1,060	463	910	960
18	......	......	15,300	2,790	4,030	346	254	162	760	442	860	810
19	......	......	15,600	2,600	2,600	311	257	213	687	422	810	910
20	......	......	15,300	2,150	1,970	291	201	225	641	422	760	960
21	......	......	10,100	1,790	1,560	287	172	263	572	402	760	810
22	......	......	4,450	1,670	1,340	294	231	346	442	364	760	810
23	......	......	3,610	1,500	1,450	234	244	294	422	422	664	760
24	......	......	2,920	2,270	1,120	250	254	328	484	1,850	618	810
25	......	......	2,150	2,030	910	328	263	234	810	1,230	641	710
26	......	......	1,730	1,620	810	311	182	277	1,280	1,620	710	710
27	......	......	1,970	1,400	710	267	201	364	910	1,230	710	710
28	......	......	2,660	1,230	641	219	231	1,060	1,060	960	760	528
29	......	......	12,100	1,850	618	213	234	910	810	810	710	484
30	......	......	16,200	9,480	664	201	294	463	710	710	687	710
31	......	......	14,900	......	810	......	201	364	......	641	......	1,340

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Genesee River at Jones Bridge, near Mount Morris, N. Y., for 1912.

[Drainage area, 1,410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	780	0.553	0.64	C.
February	....	....	580	.411	.44	C.
March	16,200	....	4,500	3.19	3.68	B.
April	16,500	1,230	6,110	4.33	4.83	A.
May	6,280	618	1,680	1.19	1.37	A.
June	710	201	377	.267	.30	A.
July	506	141	256	.182	.21	A.
August	1,060	146	296	.210	.24	A.
September	1,620	234	701	.497	.55	A.
October	2,400	364	821	.582	.67	A.
November	2,660	528	983	.697	.78	A.
December	5,220	484	1,340	.950	1.10	A.
The year	16,500	141	1,540	1.09	14.81	

NOTE.—Discharge Jan. 5 to Mar. 16 estimated by means of comparison with discharge at Rochester and St. Helena.

Mean discharge Jan. 5–31 estimated 705 second-feet.

Mean discharge Mar. 1–16 estimated 430 second-feet.

GENESEE RIVER AT ROCHESTER, N. Y.

Location.—At the highway bridge known locally as Elmwood Avenue Bridge, at the north end of South Park, 3½ miles above the center of the city of Rochester, 3½ miles below the mouth of Black Creek (coming in from the left), and 7½ miles above the mouth of the river.

Records available.—February 9, 1904, to December 31, 1912, published also in annual reports of the State engineer and surveyor, the State Water Supply Commission, and the Conservation Commission of the State of New York. Elevation of water surface, measurements, and records of flow of Genesee River at Rochester during flood stages, and low water previous to 1904, published in annual reports of the State engineer and surveyor, 1902-3-4, and in Water-Supply Papers 24, 65, and 97.

Drainage area.—2,360 square miles.

Gage.—Prior to 1910 a staff gage bolted to the downstream end of the first pier from the right-hand abutment was read once daily. From December, 1910, to December, 1912, gage heights recorded by a Gurley automatic water stage register in the pump house immediately below the bridge on the right-hand bank. Elevation of zero of gage, 506.848 Barge Canal datum and 245.591 Rochester City datum. Gage datum unchanged since installation of the station.

Channel.—Gravel; smooth; considered permanent.

Discharge measurements.—Made from bridge at which the staff gage is located. Prior to 1904 measurements and elevations of water surface taken in conjunction with the water flowing over and around Johnson-Seymour dam in the city of Rochester.

Winter flow.—Affected by ice for short periods, although, as a rule, the channel is open.

Accuracy.—Discharge rating curve well developed for all stages; published data considered good for periods of open water.

Cooperation.—Gage attended by Mr. G. A. Bailey, of the Rochester Light & Railway Co.

Discharge measurements of Genesee River at Rochester, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 13[a]	C. S. De Golyer	1.76	342
Mar. 15[b]	G. H. Canfield	3.10	1,830

[a] Measurement made under complete ice cover, about 1,500 feet above bridge.
[b] Measurement made under complete ice cover, about 1,000 feet below gage.

Daily gage height, in feet, of Genesee River at Rochester, N. Y., for 1912.

[G. A. Bailey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.14	2.04	3.85	9.4	5.5	1.76	1.04	1.04	1.09	1.44	0.58	1.41
2	2.09	1.99	3.37	9.9	4.0	1.78	1.07	1.03	1.00	2.02	1.11	1.41
3	2.03	1.93	2.95	10.1	3.2	1.54	1.05	1.02	1.63	2.15	1.00	1.74
4	2.06	1.89	2.65	9.7	2.8	1.28	1.05	1.03	2.09	1.74	1.00	3.72
5	1.94	1.88	2.45	8.4	2.49	1.52	1.07	1.01	1.86	1.53	.77	2.99
6	....	1.85	2.32	7.6	2.32	1.85	1.07	1.05	1.57	1.41	.62	2.46
7	....	1.80	2.24	8.0	2.28	1.75	1.06	1.02	1.40	1.33	1.03	3.44
8	....	1.77	2.24	8.2	2.30	1.68	1.04	1.02	1.32	1.30	1.56	3.20
9	2.14	1.78	2.34	8.1	2.21	1.65	.98	1.00	1.25	1.24	2.76	2.45
10	2.29	1.80	2.43	6.8	2.09	1.58	.98	.99	1.19	1.19	2.56	1.92
11	2.25	1.80	2.57	5.5	2.00	1.56	1.16	.99	1.13	1.19	2.51	1.84
12	2.04	1.76	2.76	4.6	1.92	1.54	1.24	....	1.08	1.26	2.17	2.05
13	1.91	1.77	2.74	4.5	1.88	1.52	1.22	....	1.03	1.48	1.95	2.56
14	1.90	1.74	2.69	4.8	1.90	1.48	1.18	.92	1.02	1.37	1.81	2.33
15	1.79	1.74	3.32	4.3	1.96	1.41	1.20	.91	1.02	1.30	1.75	1.96
16	1.76	1.76	5.4	4.45	1.99	1.40	1.44	.90	1.00	1.23	1.71	1.70
17	1.75	1.76	7.5	4.3	3.5	1.34	1.26	.91	.96	1.15	1.60	1.64
18	1.73	1.75	6.6	3.7	4.8	1.34	1.12	.96	.95	1.10	1.54	1.59
19	1.72	1.74	7.1	3.4	3.85	1.36	1.04	.92	1.17	1.05	1.51	1.59
20	1.86	2.23	8.6	3.2	3.1	1.34	1.01	.93	1.54	.98	1.46	1.64
21	2.13	3.44	9.0	2.95	2.85	1.26	1.03	.98	1.44	.89	1.44	1.70
22	2.72	3.18	7.7	2.75	2.85	1.23	1.02	.97	1.34	.92	1.44	1.61
23	2.84	2.70	5.2	2.9	2.8	1.25	1.01	1.02	1.30	.95	1.38	1.69
24	2.72	2.81	4.05	3.2	2.7	1.19	1.03	1.02	1.21	.95	1.38	1.45
25	2.60	2.85	3.5	3.15	2.33	1.19	1.03	1.00	1.20	1.80	1.37	1.48
26	2.45	3.07	3.05	2.9	2.07	1.18	1.00	.94	1.19	1.85	1.36	1.43
27	2.29	3.39	2.9	2.6	1.93	1.18	.97	.96	1.21	1.89	1.36	1.41
28	2.17	3.85	3.8	2.37	1.78	1.16	.98	1.02	1.67	1.89	1.42	1.42
29	2.14	4.05	5.9	2.24	1.73	1.09	1.03	1.44	1.69	1.56	1.40	1.45
30	2.10	....	7.8	3.85	1.66	1.04	1.08	1.34	1.47	1.34	1.38	1.32
31	2.07	....	8.9	....	1.67	....	1.05	1.19	....	1.14	....	1.41

NOTE.—Mean gage height obtained by averaging hourly readings for each 24-hour period. Relation of gage height to discharge affected by ice Jan. 4 to Mar. 17.

Daily discharge, in second-feet, of Genesee River at Rochester, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,850	740	3,110	22,800	9,900	1,240	354	354	396	782	102	743
2	1,760	640	2,250	24,700	5,800	1,270	380	346	320	1.640	414	743
3	1,650	580	1,610	25,400	3,940	916	362	337	1,040	1,870	320	1,210
4	1,660	520	1,200	24,000	3,100	588	362	346	1,760	1,210	320	5,130
5	1,440	500	958	19,200	2,480	888	380	328	1,390	902	178	3,480
6	1,400	460	812	16,400	2,180	1,380	380	362	958	743	118	2,430
7	1,400	420	730	17,800	2,100	1,220	371	337	730	646	345	4,470
8	1,500	360	730	18,500	2,140	1,120	354	337	634	610	944	3,940
9	1,600	360	834	18,200	1,980	1,080	306	320	555	544	3,020	2.410
10	1,840	360	934	13,900	1,760	972	306	313	490	490	2,620	1,480
11	1,660	360	1,100	9,900	1,600	944	462	313	433	490	2,520	1,360
12	1,340	334	1,340	7,380	1,480	916	544	297	388	566	1,910	1.690
13	1,100	340	1,310	7,100	1,420	888	522	281	345	834	1,520	2,630
14	1,080	321	1,250	7,940	1,450	834	481	264	337	694	1,320	2.190
15	880	321	2,170	6,580	1,540	743	500	257	337	610	1,220	1,540
16	840	334	6,700	6,970	1,580	730	782	250	320	533	1,160	1,150
17	780	334	16,100	6,580	4,600	658	566	257	292	452	1,000	1,060
18	760	328	13,200	5,080	7,940	658	424	292	285	406	916	986
19	700	321	14,800	4,380	5,440	682	354	264	471	362	874	986
20	880	720	20,000	3,940	3,720	658	328	271	916	306	808	1,060
21	1,170	2,370	21,400	3,400	3,200	566	346	306	782	244	782	1,150
22	2,000	1,950	16,800	3,000	3,200	533	337	299	658	264	782	1,020
23	2,140	1,260	9,060	3,300	3,100	555	328	337	610	285	706	1,140
24	1,960	1,410	5,930	3,940	2,900	490	346	337	511	285	706	795
25	1,700	1,460	4,600	3,830	2,190	490	346	320	500	1,300	694	834
26	1,500	1,780	3,610	3,300	1,730	481	320	278	490	1,380	682	769
27	1,200	2,280	3,300	2,700	1,500	481	299	292	511	1,440	682	743
28	1,000	3,110	5,320	2,270	1,270	462	306	337	1,100	1,440	756	756
29	920	3,510	11,100	2,030	1,200	396	346	782	1,140	944	730	795
30	860	....	17,100	5,440	1,090	354	388	658	821	658	706	634
31	780	....	21,000	....	1,100	....	362	490	....	443	....	743

NOTE.—Daily discharge Jan. 1-3 and Mar. 17 to Dec. 31 determined from a fairly well defined rating curve. Discharge Feb. 10 to Mar. 15 determined from a rating curve based on measurements with ice present; discharge Jan. 4 to Feb. 9 estimated by assuming that the conditions of flow were changing gradually from open water to complete ice cover; discharge Mar. 16 estimated; discharge Aug. 12 and 13 interpolated.

Monthly discharge of Genesee River at Rochester, N. Y., for 1912.

[Drainage area 2,360 square miles.]

Month.	Maximum.				Minimum.	Mean.	Per square mile.	Run-off depth in inches.	Accuracy.
	Day.	Hour.	Gage height.	Discharge.					
			Feet.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*		
January	23	9.00 p. m.	2.93	[a] 2,300	[a] 700	1,330	0.564	0.65	B.
February	29	11.45 a. m.	4.09	[a] 3,550	[a] 320	958	.406	.44	B.
March	20	10.45 p. m.	9.26	22,300	[a] 730	6,790	2.88	3.32	B.
April	3	12.45 p. m.	10.10	25,500	2,000	10,000	4.24	4.73	A.
May	1	5.00 a. m.	5.87	11,000	1,060	2,860	1.21	1.40	A.
June	2	6.00 a. m.	1.92	1,480	320	773	.328	.37	A.
July	16	3.15 a. m.	1.53	902	271	395	.167	.19	B.
August	29	1.30 p. m.	1.50	860	238	341	.144	.17	B.
September	3	11.30 p. m.	2.16	1,890	257	651	.276	.31	A.
October	2	9.45 p. m.	2.43	2,370	232	754	.319	.37	A.
November	9	8.30 p. m.	2.88	3,260	102	962	.408	.46	A.
December	4	10.30 a. m.	3.91	5,580	610	1,610	.682	.79	A.
The year	Apr. 3	12.45 p. m.	10.10	25,500	102	2,280	.966	13.20	

[a] Discharge from ice rating.

CANASERAGA CREEK NEAR DANSVILLE, N. Y.

Location.—At the highway bridge 1 mile due west from the village of Dansville, about 2,200 feet below the mouth of Mill Brook (coming in from the right) and about 22 miles above the mouth of the creek.

Records available.—July 21, 1910, to December 31, 1912. Data published also in annual reports of State Water Supply Commission, State Conservation Commission, and State engineer and surveyor, State of New York.

Drainage area.—167 square miles.

Gage.—Staff, bolted to the downstream side of the left-hand abutment; read twice daily; datum unchanged.

Channel.—Sand and gravel; shifts during high water.

Discharge measurements.—At high stages made from the bridge; at low stages, by wading below the bridge.

Winter flow.—The relation of gage height to discharge is affected by ice.

Accuracy.—Discharge rating curves somewhat uncertain because of shifting channels. Estimates as published only fair.

Discharge measurements of Canaseraga Creek near Dansville, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 12[a]	G. H. Canfield	2.61	97.3	July 19[b]	Frank Weber	2.13	33.4
17	do	4.21	1,500	Sept. 23[c]	J. G. Mathers	2.09	29.2
18	do	3.58	984	23[c]	do	2.10	31.0
23	do	2.67	263	Oct. 26[c]	C. S. De Golyer	2.37	75.3
24	do	2.53	200	26[c]	do	2.37	73.5
Apr. 4	G. K. Larrison	3.05	409	28[c]	do	2.27	50.9
Apr. 6	do	3.82	1,120				

[a] Made one-fourth mile below station; ice at control.
[b] Made by wading above bridge.
[c] Made by wading below gage.

Daily gage height, in feet, of Canaseraga Creek near Dansville, N. Y., for 1912.

[Floyd Harter, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.69	......	......	4.2	3.2	2.72	2.22	2.12	2.38	2.40	2.22	2.32
2	2.54	......	......	4.5	3.05	2.72	2.22	2.18	3.18	2.22	2.18	2.30
3	2.34	......	......	3.3	2.98	2.82	2.25	2.28	2.92	2.20	2.22	2.40
4	......	......	......	3.1	2.88	2.72	2.20	2.32	2.48	2.15	2.18	2.70
5	......	......	......	4.0	2.72	2.72	2.22	2.22	2.22	2.18	2.20	2.62
6	......	......	......	4.15	2.62	2.75	2.32	2.32	2.16	2.15	2.18	2.72
7	......	......	......	4.1	2.72	2.60	2.30	2.22	2.12	2.18	2.62	2.55
8	......	......	......	3.3	2.78	2.48	2.22	2.13	2.10	2.18	2.82	2.32
9	......	......	......	3.2	2.55	2.42	4.2	2.12	2.13	2.18	2.62	2.28
10	......	......	......	3.05	2.45	2.35	3.55	2.12	2.12	2.22	2.48	2.30
11	......	......	......	2.98	2.50	2.32	3.2	2.10	2.12	2.15	2.32	2.32
12	......	......	......	2.98	2.58	2.32	3.2	2.14	2.15	2.18	2.32	2.32
13	......	......	2.15	2.88	2.70	2.32	2.90	2.08	2.12	2.15	2.28	2.30
14	......	......	1.92	3.0	2.52	2.28	3.3	2.02	2.18	2.12	2.32	2.38
15	......	......	3.65	3.3	2.48	2.22	2.72	2.02	2.22	2.08	2.28	2.35
16	......	......	3.8	3.1	3.4	2.28	2.52	2.00	2.30	2.05	2.25	2.42
17	......	......	3.9	2.92	2.35	2.28	2.38	2.08	2.18	2.10	2.32	2.42
18	......	......	4.1	3.1	3.3	2.22	2.32	2.28	2.40	2.08	2.30	2.55
19	......	......	3.85	2.82	3.2	2.20	2.20	2.22	2.22	2.08	2.25	2.50
20	......	......	3.7	2.2	3.1	2.22	2.20	2.30	2.22	2.10	2.25	2.48
21	......	......	3.2	1.95	2.95	2.22	2.30	2.22	2.18	2.05	2.22	2.42
22	......	......	2.92	2.22	2.82	2.28	2.22	2.22	2.18	2.08	2.25	2.42
23	......	......	2.65	2.30	2.82	2.22	2.18	2.58	2.15	2.42	2.22	2.42
24	......	......	2.55	2.01	2.78	2.22	2.15	2.45	2.55	2.48	2.32	2.42
25	......	......	2.65	1.90	2.70	2.18	2.12	2.22	2.58	2.38	2.35	2.40
26	......	......	2.65	1.82	2.72	2.20	2.38	2.28	2.30	2.38	2.32	2.45
27	......	......	3.05	1.78	2.75	2.22	2.18	2.28	2.18	2.38	2.30	2.58
28	......	......	3.52	1.72	2.70	2.20	2.12	2.22	2.15	2.30	2.28	2.48
29	......	......	5.2	2.30	2.72	2.25	2.10	2.20	2.28	2.28	2.25	2.65
30	......	......	3.95	3.4	2.65	2.22	2.13	2.18	2.78	2.28	2.28	2.98
31	......	......	3.7	......	2.65	......	2.10	2.12	......	2.25	......	2.92

NOTE.—Definite information regarding effect of ice is lacking, but backwater from ice may have affected the relation between gage height and discharge during March.

Daily discharge, in second-feet, of Canaseraga Creek near Dansville, N. Y., for 1910–1912.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.						
1	......	25	33	25	28	49
2	......	25	25	20	30	61
3	......	28	42	20	25	81
4	......	28	30	18	30	69
5	......	25	25	18	30	65
6	......	25	38	25	30	49
7	......	28	28	55	28	45
8	......	25	25	28	28	33
9	......	25	28	25	45	42
10	......	49	25	25	69	38
11	......	33	22	22	98	......
12	......	25	22	25	49	......
13	......	25	22	22	30	......
14	......	25	25	20	33	......
15	......	22	22	22	20	......
16	......	22	22	20	38	......
17	......	25	25	22	33	......
18	......	28	25	22	33	......
19	......	38	28	18	49	......
20	......	28	25	18	42	......
21	25	25	22	22	33	......
22	22	25	22	25	30	......
23	25	22	22	22	38	......
24	28	20	38	25	30	......
25	25	22	28	42	81	......
26	25	33	25	33	69	......
27	25	25	25	33	55	......
28	30	25	22	30	75	......
29	25	22	22	33	65	......
30	38	22	25	30	49	......
31	25	22	......	33	......	......

Daily discharge, in second-feet, of Canaseraga Creek, near Danville, N. Y., for 1910–1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	......	......	550	105	140	105	30	10	115	77	83	120
2	......	......	550	75	208	105	28	10	55	110	77	108
3	......	......	390	85	166	75	25	12	53	63	71	115
4	......	......	301	90	140	61	20	33	32	77	49	120
5	......	......	350	468	130	85	12	28	61	71	63	90
6	......	......	310	450	110	81	18	20	61	49	67	100
7	......	......	208	1,140	90	61	20	18	36	355	105	108
8	......	......	218	700	98	69	18	22	120	283	69	120
9	......	......	301	372	90	49	22	18	77	283	132	105
10	......	......	515	320	69	45	20	10	44	194	100	140
11	......	......	700	274	69	75	22	18	32	120	81	120
12	......	......	930	197	61	110	20	10	42	125	108	150
13	......	......	1,190	175	49	130	22	12	53	90	110	550
14	......	......	1,520	225	49	105	20	10	36	73	105	390
15	......	......	1,520	184	45	75	15	30	32	73	125	261
16	......	......	745	140	33	55	20	85	33	57	105	390
17	......	142	515	175	69	42	75	42	33	49	132	366
18	......	700	620	160	75	38	55	61	30	73	366	261
19	......	880	620	135	49	33	33	42	42	53	222	241
20	......	700	450	184	49	30	61	22	39	42	190	132
21	......	450	301	160	55	33	30	20	29	44	138	88
22	......	320	301	175	49	42	28	22	28	57	120	110
23	......	148	288	233	55	33	25	22	32	67	105	222
24	......	81	184	184	75	30	22	30	38	49	122	233
25	......	175	350	140	105	33	20	69	36	53	112	187
26	......	384	390	115	81	30	18	42	47	42	108	158
27	......	700	1,460	90	61	42	15	22	33	61	105	315
28	......	660	1,080	69	55	69	12	175	36	57	95	218
29	......	......	320	45	33	49	12	190	49	49	158	163
30	......	......	218	42	30	30	12	115	57	55	125	172
31	......	......	148	......	45	......	10	110	......	93	......	288
1912.												
1	261	......	......	1,520	480	200	50	34	84	89	50	71
2	204	......	......	1,880	380	200	50	43	466	50	43	66
3	145	......	......	620	338	250	56	62	302	46	50	89
4	......	......	......	480	280	200	46	71	110	38	43	190
5	......	......	......	1,290	200	200	50	50	50	43	46	158
6	......	......	......	1,460	158	215	71	71	40	38	43	200
7	......	......	......	1,400	200	150	66	50	34	43	158	132
8	......	......	......	560	230	110	50	36	31	43	250	71
9	......	......	......	480	132	94	1,520	34	36	43	158	62
10	......	......	......	380	102	78	800	34	34	50	110	66
11	......	......	......	338	115	71	480	31	34	38	71	71
12	......	......	......	338	143	71	480	37	38	43	71	71
13	......	......	98	280	190	71	290	28	34	38	62	66
14	......	......	49	350	122	62	560	21	43	34	71	84
15	......	......	930	560	110	50	200	21	50	28	62	78
16	......	......	1,080	410	650	62	122	18	66	24	56	94
17	......	......	1,190	302	605	62	84	28	43	31	71	94
18	......	......	1,410	410	560	50	71	62	89	28	66	132
19	......	......	1,140	250	480	46	46	50	50	28	56	115
20	......	......	980	46	410	50	46	66	50	31	56	110
21	......	......	550	14	320	50	66	50	43	24	50	94
22	......	......	372	50	250	62	50	50	43	28	56	94
23	......	......	245	66	250	50	43	143	38	94	50	94
24	......	......	208	19	230	50	38	102	132	110	71	94
25	......	......	245	10	190	43	34	50	143	84	78	89
26	......	......	245	6	200	46	84	62	66	84	71	102
27	......	......	450	4	215	50	43	62	43	84	66	143
28	......	......	808	3	190	46	34	50	38	66	62	110
29	......	......	2,820	66	200	56	31	46	62	62	56	170
30	......	......	1,240	650	170	50	36	43	230	62	62	338
31	......	......	980	......	170	......	31	34	......	56	......	302

NOTE.—Daily discharge for 1910 and 1911, and from Jan. 1 to 3 and Mar. 13 to Apr. 3, 1912, determined from a poorly defined rating curve; discharge June 18, 1911, interpolated.

Monthly discharge of Canaseraga Creek near Dansville, N. Y., for 1910–1912.

[Drainage area, 167 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910.						
July 21-31	38	22	26.6	0.159	0.07	C.
August	49	20	26.4	.158	.18	C.
September	42	22	26.3	.157	.18	C.
October	55	18	25.7	.154	.18	C.
November	98	25	43.4	.260	.29	C.
1911.						
February 17-28	880	81	445	2.66	1.19	D.
March	1,520	148	566	3.39	3.91	D.
April	1,140	42	230	1.38	1.54	B.
May	208	30	78.5	.470	.54	B.
June	130	30	60.7	.363	.40	B.
July	75	10	24.5	.147	.17	C.
August	190	10	42.9	.257	.30	C.
September	120	28	47.0	.281	.31	C.
October	355	42	95.0	.569	.66	B.
November	366	49	118	.707	.79	B.
December	550	88	198	1.19	1.37	B.
1912.						
March	2,820	49	529	3.17	3.66	D.
April	1,880	3	475	2.84	3.17	B.
May	650	102	267	1.60	1.84	B.
June	250	43	93.2	.558	.62	B.
July	1,520	31	182.	1.09	1.26	B.
August	143	18	49.6	.297	.34	B.
September	466	31	84.1	.504	.56	B.
October	110	24	50.3	.301	.35	B.
November	250	43	73.8	.442	.49	B.
December	338	62	118	.707	.82	B.

NOTE.—Mean discharge Mar. 1 to 12, 1912, estimated 110 second-feet by means of comparison with adjacent stations.

KESHEQUA CREEK AT SONYEA, N. Y.

Location.—On the second highway bridge in the village of Sonyea, 2½ miles above its confluence with Canaseraga Creek and about 4 miles downstream from Tuscarora.

Records available.—July 22, 1910, to December 31, 1912. Data also in annual reports of State Water Supply Commission, New York State Conservation Commission, and State engineer and surveyor, State of New York.

Drainage area.—67 square miles.

Gage.—Staff, fastened to a pile on the right bank directly back of and across from the Craig Colony power house; used for low-water readings. Chain gage installed October 25, 1910, on upstream side of second bridge; used since that date. Gage read twice daily. The zeros of these gages are not set at the same datum.

Channel.—Sand and gravel; shifts at high stages.

Discharge measurements.—At high stages made from either bridge; at low stages, by wading.

Winter flow.—Relation of gage height to discharge affected by ice.

Accuracy.—Discharge rating curves somewhat uncertain because of shifting channels. Estimates as published only fair.

Dischage measurements of Keshequa Creek at Sonyea, N. Y., in 1912.

Date.		Hydrographer.	Gage height.	Dis-charge.	Date.		Hydrographer.	Gage height.	Dis-charge.
			Feet.	*Sec.-ft.*				*Feet.*	*Sec.-ft.*
Mar.	14[a]	G. H. Canfield	5.38	81.2	Apr.	6	G. K. Larrison	4.63	385
	16[b]	.....do	5.87	630	July	17[c]	Frank Weber	3.17	7.3
	17[b]	.....do	4.99	286		19[c]	.....do	3.03	3.7
	19	.....do	4.45	255	Sept.	21[d]	J. G. Mathers	3.11	5.8
	19	.....do	5.06	556		21[d]	.....do	3.10	5.5
	23	.....do	3.56	50.0	Oct.	26	C. S. DeGolyer	3.74	41.9
Apr.	5	G. K. Larrison	5.28	791		28	.....do	3.42	16.8

[a] Made under complete ice cover.
[b] Obstructed by ice.
[c] Made by wading below gage.
[d] Made by wading ½ mile above gage.

Daily gage height, in feet, of Keshequa Creek at Sonyea, N. Y., for 1912.

[F. E. Reynolds, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.80		5.4	4.8	3.98	3.38	3.00	3.02	3.30	3.22	3.25	3.45
2	3.65		5.3	5.2	3.85	3.35	2.95	3.08	3.52	3.20	3.20	3.50
3	3.60			4.22	3.75	3.32	2.98	3.22	3.65	3.15	3.25	3.80
4	3.55			3.68	3.68	3.30	2.95	3.12	3.42	3.12	3.25	3.72
5	3.42			5.1	3.62	3.30	3.08	3.15	3.20	3.10	3.25	4.20
6				4.7	3.65	3.30	3.18	3.10	3.15	3.05	3.25	4.82
7			5.3	5.5	3.65	3.28	3.08	3.08	3.08	3.05	3.35	3.92
8				4.9	3.58	3.25	2.98	3.08	3.05	3.10	3.70	3.68
9				4.18	3.58	3.18	2.90	2.98	3.02	3.10	3.85	3.55
10				4.15	3.58	3.15	3.40	3.08	3.00	3.10	3.72	3.55
11				4.00	3.48	3.15	3.55	3.00	3.00	3.18	3.62	3.50
12				4.08	3.42	3.20	3.68	3.10	3.00	3.15	3.38	3.40
13			5.2	4.15	3.58	3.20	3.32	3.10	2.98	3.20	3.35	3.30
14			5.2	4.02	3.60	3.18	3.52	3.10	2.95	3.18	3.35	3.20
15			6.0	4.18	3.60	3.15	3.32	3.05	3.22	3.15	3.35	3.20
16			6.1	4.05	4.18	3.05	3.20	2.98	3.52	3.10	3.32	3.22
17			5.7	3.90	4.25	3.08	3.18	2.98	3.48	3.20	3.30	3.25
18			5.0	3.90	3.90	3.12	3.10	3.08	3.38	3.20	3.30	3.25
19	4.7		4.9	3.88	3.72	3.10	3.02	3.10	3.22	3.18	3.30	3.30
20	4.65	5.0	4.7	3.85	3.70	3.12	3.05	3.05	3.10	3.20	3.30	3.40
21	4.55	4.8	3.80	3.70	3.60	3.10	3.02	3.12	3.05	3.52	3.25	3.35
22	4.55	4.75	3.75	3.78	3.70	3.10	3.02	3.20	3.05	3.48	3.25	3.25
23		4.7	3.70	4.00	3.60	3.10	3.08	3.08	3.05	3.62	3.25	3.20
24		5.0	3.60	3.85	3.60	3.08	3.00	3.05	3.20	3.72	3.25	3.30
25		5.3	3.58	3.80	3.45	3.00	3.05	3.05	3.20	3.45	3.30	3.40
26		5.7	3.48	3.70	3.35	3.18	3.25	3.20	3.18	3.35	3.30	3.48
27		5.6	4.65	3.65	3.28	3.08	3.15	3.15	3.15	3.30	3.42	3.42
28		5.5	4.95	3.60	3.30	3.02	3.00	3.15	3.10	3.28	3.42	3.25
29		5.4	6.0	4.20	3.38	3.00	3.00	3.08	3.12	3.20	3.42	3.40
30			4.65	4.35	3.45	3.00	3.00	3.05	3.18	3.20	3.45	3.40
31			4.65		3.45		3.02	3.02				3.35

NOTE.—Relation of gage height to discharge affected by ice Jan. 6 to Mar. 17.

Daily discharge, in second-feet, of Keshequa Creek at Sonyea, N. Y., for 1911–12.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.										
1	68	72	51	13	4	3	8	12	14	30
2	53	60	65	14	3	3	5	36	13	32
3	53	78	65	14	4	4	4	14	12	23
4	53	68	51	10	5	10	5	13	12	18
5	53	430	39	9	3	6	6	12	12	14
6	41	285	30	9	4	4	18	12	14	26
7	36	245	39	9	6	6	10	208	32	26
8	41	137	36	9	7	5	355	41	41	36
9	60	128	30	8	5	4	330	32	43	43
10	355	119	26	8	4	4	113	21	36	47
11	515	100	26	8	4	4	28	30	26	47
12	670	68	26	9	4	4	36	32	26	108
13	405	56	20	23	4	3	28	30	28	458
14	330	53	18	14	2	3	14	23	26	128
15	210	51	18	12	3	4	14	14	26	175
16	128	47	18	9	3	4	8	14	30	128
17	68	51	20	8	20	5	6	12	32	149
18	60	53	18	8	14	4	6	14	192	78
19	65	53	18	6	5	4	7	14	265	47
20	68	53	14	5	4	4	5	14	41	26
21	68	53	12	6	5	3	5	14	41	26
22	137	53	10	6	6	3	5	18	41	28
23	108	53	13	6	6	2	6	15	41	169
24	93	51	41	6	5	2	5	14	330	51
25	68	47	26	5	4	7	4	14	159	36
26	72	47	21	4	6	8	6	13	41	36
27	485	47	13	3	6	6	7	12	36	113
28	203	41	9	8	6	26	8	12	43	53
29	93	30	7	4	3	18	8	12	68	36
30	100	26	6	4	2	21	14	12	36	36
31	78	....	7	....	3	8	....	15	....	36
1912.										
1	90	485	95	15	3	3	11	9	10	18
2	80	735	65	14	3	5	23	8	8	21
3	80	217	48	12	3	9	34	6	10	55
4	80	65	38	11	3	6	17	6	10	43
5	80	670	31	11	5	6	8	5	10	160
6	80	430	34	11	7	5	6	4	10	436
7	80	950	34	10	5	5	5	4	14	80
8	80	533	27	10	3	5	4	5	40	38
9	70	196	27	7	2	3	3	5	65	25
10	70	185	27	6	16	5	3	5	43	25
11	60	137	20	6	25	3	3	7	31	21
12	60	155	17	8	38	5	3	6	15	16
13	50	177	27	8	12	5	3	8	14	11
14	50	140	29	7	23	5	3	7	14	8
15	500	190	29	6	12	4	9	6	14	8
16	750	155	154	4	8	3	23	5	12	9
17	600	102	178	5	7	3	20	8	11	10
18	530	102	75	6	5	5	15	8	11	10
19	470	97	43	5	3	5	9	7	11	11
20	365	87	40	6	4	4	5	8	11	16
21	55	58	29	5	3	6	4	23	10	14
22	48	73	40	5	3	8	4	20	10	10
23	40	122	29	5	5	5	4	31	10	8
24	29	82	29	5	3	4	8	43	10	11
25	27	73	18	3	4	4	8	18	11	16
26	20	55	14	7	10	8	7	14	11	20
27	340	48	10	5	6	6	6	11	17	17
28	500	29	11	3	3	6	5	10	17	10
29	1,250	160	15	3	3	5	6	8	17	16
30	405	212	18	3	3	4	7	8	18	16
31	405	....	18	....	3	3	....	9	....	14

NOTE.—Daily discharge for the open-water period in 1911 and 1912, except Apr. 8–30, 1912, determined from two fairly well defined rating curves, one applicable Jan. 1 to Dec. 31, 1911, and Mar. 30 to Apr. 7, 1912, and the other Jan. 1 to Mar. 29 and May 1 to Dec. 31, 1912. Discharge Apr. 8–30, 1912, obtained by the indirect method for shifting channels. Discharge Mar. 1–17, 1912, estimated by means of measurements made during the period and from climatologic records.

Monthly discharge of Keshequa Creek at Sonyea, N. Y., for 1911-12.

[Drainage area, 67 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1911.						
March	670	36	156	2.33	2.69	D.
April	430	26	88.5	1.32	1.47	B.
May	65	6	25.6	.382	.44	B.
June	23	3	8.6	.128	.14	C.
July	20	2	5.2	.078	.09	C.
August	26	2	6.2	.092	.11	C.
September	355	4	35.8	.534	.60	B.
October	203	12	24.0	.358	.41	B.
November	330	12	58.6	.875	.98	B.
December	458	14	72.9	1.09	1.26	B.
1912.						
March	....	....	237	3.06	3.53	D.
April	950	29	224	3.34	3.73	D.
May	178	10	40.9	.610	.70	B.
June	15	3	7.1	.106	.12	C.
July	38	2	7.5	.112	.13	C.
August	9	3	4.9	.073	.08	C.
September	34	3	8.9	.133	.15	C.
October	43	4	10.4	.155	.18	C.
November	65	8	16.5	.246	.27	C.
December	426	8	37.5	.560	.65	B.

CANADICE LAKE OUTLET NEAR HEMLOCK, N. Y.

Location.—In outlet at foot of lake. Canadice Lake is tributary to Genesee River through Hemlock Lake outlet and Honeoye Creek.

Records available.—April, 1903, to December 31, 1912. Data also found in annual reports of the New York State engineer and surveyor and the reports of the city engineer of Rochester, N. Y.

Drainage area.—12.6 square miles, of which 0.7 square mile is lake surface.

Gage.—Hook, in channel above gate.

Discharge measurements.—Outlet is measured over a standard, thin-edged weir with a 5-foot crest and two end contractions, so arranged with needle timbers at the ends that the length may be increased to 14.96 with no end contractions during high water. The weir crest stands 3 feet above the stream channel and is never submerged by backwater. Two additional rectangular gates, each 1 foot square, with three complete contractions and a fourth partial contraction at the bottom, afford by-passes during high water. The depth of water on the weir is read each morning to hundredths of a foot by means of the hook gage. Each change of the gates is also noted. Corrections are made for velocity of approach for the higher stages. All computations are made by the Francis formula.

Diversions.—No water is diverted from Canadice Lake above the station.

Artificial control.—The outflow of the lake at the dam above the weir is controlled by the gates.

Winter flow.—The pool above the weir is free from ice throughout the winter.

Accuracy.—Records are considered excellent.

Cooperation.—The observations and computations are made by engineers of the city engineer's office of Rochester, N. Y., under the direction of E. A. Fisher, city engineer, and John F. Skinner, principal assistant city engineer.

Monthly discharge of Canadice Lake outlet near Hemlock, N. Y., for 1912.

[Drainage area, 12.6 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Mean elevation of lake above low water mark.
	Mean.	Per square mile.		
				Feet.
January	9.788	0.777	0.90	1.277
February	8.443	.670	.72	.964
March	16.338	1.30	1.50	1.569
April	48.852	3.88	4.33	2.573
May	15.062	1.19	1.37	2.653
June	9.492	.753	.84	2.607
July	7.584	.602	.69	1.464
August	5.297	.420	.48	.932
September	5.198	.413	.46	.994
October	5.630	.447	.52	.742
November	6.547	.520	.58	.941
December	7.217	.573	.66	1.135
The year	12.115	.962	13.05	1.436

NOTE.—Leakage through and under weir measured in May, 1912, and found to be 0.6 second-foot. This amount has been added to the weir records for the whole year.

OWASCO OUTLET NEAR AUBURN, N. Y.

Location.—On the farm of George Ridley, 3¾ miles below the State dam at the outlet of Owasco Lake, 2 miles below the center of the city of Auburn.

Records available.—November 17 to December 31, 1912.

Drainage area.—206 square miles.

Gage.—Gurley automatic water stage register installed over a concrete well 3½ feet square and 6 feet deep (inside dimensions) and sheltered by a concrete house 5 by 6 feet (inside dimensions). The gage well is connected with the river by a 4-inch cast-iron pipe.

Channel.—The gage heights registered by this gage are controlled by a low concrete weir located a short distance below the gage. The crest of this weir is 1 foot wide and the slopes of both upstream and downstream faces are 0.5 : 1. A small horizontal apron was built on a level with the bed of the stream, extending downstream 2½ feet from the toe of the dam. The left-hand end of the dam, for a distance of 50 feet, has a mean elevation of gage height 1.28 feet; the remaining 50 feet of the crest of the dam is at gage height 2.12 feet.

Discharge measurements.—Made by wading directly opposite the gage at low stages and from a cable and car at the same section at high stages.

Winter flow.—No data.

Diversions.—An average flow of about 10 second-feet is pumped from Owasco Lake for the municipal water supply of the city of Auburn. It is not known what proportion of this gets back into the stream above the gaging station.

Accuracy.—Discharge measurements already made have been very consistent and estimates are excellent.

Discharge measurements of Owasco Outlet near Auburn, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 22	C. C. Covert		111
Nov. 21[a]	G. H. Canfield	2.53	319
22[a]	do	2.53	318
23[a]	do	2.73	418
24[a]	do	1.88	79.3
24[a]	do	2.14	147
28[b]	do	1.46	9.7
28[c]	do	1.44	8.4
30[a]	do	2.75	436

[a] Made by wading at gage.
[b] Made by wading 60 feet below gage.
[c] Made by wading 200 feet below gage.

NOTE.—At the time measurement No. 5 was made the low-water section of the control was just full.

Daily gage height, in feet, of Owasco Outlet near Auburn, N. Y., for 1912.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		1.88	11		2.61	21	2.45	2.41
2		2.51	12		2.60	22	2.48	2.40
3		2.48	13		2.52	23	2.45	2.42
4		2.46	14		2.27	24	2.06	2.42
5		2.48	15		1.66	25	2.50	2.39
6		2.58	16		2.07	26	2.46	2.40
7		2.64	17	1.59	2.13	27	2.54	2.38
8		2.45	18	2.37	2.41	28	1.75	2.39
9		2.39	19	2.28	2.44	29	2.34	2.33
10		2.64	20	2.36	2.41	30	2.19	2.36
						31		2.38

NOTE.—Mean daily gage height obtained by averaging hourly readings for each 24-hour period.

Daily discharge, in second-feet, of Owasco Outlet near Auburn, N. Y., for 1912.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		792	11		358	21	278	259
2		308	12		353	22	293	255
3		293	13		313	23	278	264
4		283	14		198	24	125	264
5		293	15		37.4	25	303	250
6		343	16		128	26	283	255
7		373	17	26.5	144	27	323	246
8		278	18	241	259	28	52.7	250
9		250	19	202	273	29	228	223
10		373	20	237	259	30	166	237
						31		246

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Owasco Outlet near Auburn, N. Y., for 1912.

[Drainage area, 206 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
November 17-30	323	[a] 26.5	217	1.05	.55	A.
December	373	[a] 37.4	256	1.24	1.43	A.

[a] Sunday.

ONEIDA RIVER AT CAUGHDENOY, N. Y.

Location.—At Caughdenoy, about 6 miles above the old Euclid station at Oak Orchard State dam, half a mile below the mouth of Caughdenoy Creek (which enters from the north) and 5 miles below Lake Oneida.

Records available.—August 30, 1902, to December 31, 1909 (at Euclid); January 1, 1910, to December 31, 1912 (at Caughdenoy, which replaces the Euclid station). Data published also in annual reports of New York State engineer and surveyor.

Drainage area.—1,377 square miles.

Gage.—Staff, about 150 feet upstream from the dam, on the right-hand side of the stream.

Discharge measurements.—Discharge measured over a masonry dam 415 feet long, completed at Caughdenoy during the summer of 1909. This dam has a practically level crest at elevation 369.4 feet, and an ogee cross section with a slope or batter on the upstream portion of the crest of 1 foot rise in 2 feet horizontal width. The downstream part of the crest is rounded, with a radius of 3.24 feet. The discharge over the dam has been computed from formulas derived from United States Geological Survey experiments on a dam of ogee cross section similar in form, and a correction has been made for velocity of approach.

Diversions.—During the summer, and also to some extent during the winter, water is diverted past the left-hand end of the dam through the Caughdenoy lock. An estimate of the amount of water so diverted has been made and included in the calculated discharge of the river.

Cooperation.—Records furnished complete for publication by the New York State engineer and surveyor.

Daily discharge, in second-feet, of Oneida River at Caughdenoy, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,728	1,566	1,240	4,958	6,921	4,356	1,303	453	570	1,703	1,703	2,655
2	3,633	1,621	1,282	5,395	6,496	3,858	1,282	480	659	1,945	1,945	2,737
3	3,570	1,512	1,282	6,082	6,276	3,728	1,219	570	659	2,021	1,703	2,922
4	3,570	1,512	1,303	6,408	6,082	3,858	1,219	570	570	2,021	1,824	3,258
5	3,258	1,566	1,324	6,408	5,696	3,793	1,282	659	659	1,945	1,776	3,570
6	3,258	1,566	1,367	6,496	5,322	3,728	1,240	711	659	2,072	1,703	2,600
7	3,258	1,457	1,367	6,921	5,138	3,258	1,219	746	659	2,072	1,621	3,570
8	3,106	1,367	1,240	7,548	4,958	2,922	1,199	659	746	2,021	1,703	3,570
9	2,737	1,409	1,282	8,748	4,584	3,106	1,119	711	832	1,945	1,824	3,258
10	2,600	1,409	1,282	8,896	4,222	2,710	1,000	659	832	1,824	1,872	3,570
11	2,600	1,367	1,303	8,650	4,054	2,600	815	659	832	1,703	1,945	3,570
12	2,600	1,409	1,324	8,551	4,662	2,545	851	570	746	1,703	2,072	2,600
13	2,545	1,409	1,367	8,453	4,356	2,490	815	659	832	1,703	2,463	3,258
14	2,463	1,409	1,457	7,421	4,021	2,600	888	412	832	1,512	2,330	3,258
15	2,330	1,409	1,457	6,496	3,956	2,545	1,000	412	926	1,512	2,072	2,922
16	2,463	1,409	1,485	6,408	4,054	2,436	926	480	1,019	1,566	2,198	2,922
17	2,545	1,219	1,512	6,496	4,188	2,330	780	570	1,119	1,621	2,330	3,258
18	2,774	1,119	1,621	6,716	4,188	2,278	780	659	1,119	1,566	2,330	2,922
19	2,436	1,019	2,072	8,601	4,154	2,224	641	659	1,159	1,566	2,384	2,600
20	2,330	1,119	2,278	10,308	4,356	2,122	746	570	1,079	1,621	2,384	2,600
21	2,198	1,219	2,490	10,068	4,584	2,072	659	570	1,079	1,703	2,330	2,922
22	2,278	1,219	3,106	9,584	4,923	2,021	641	659	1,219	1,621	2,330	6,716
23	1,945	1,119	3,411	7,716	4,584	1,945	605	570	1,282	1,512	2,384	3,258
24	2,021	1,119	3,411	9,338	3,858	1,800	534	570	1,824	1,621	2,330	3,258
25	1,970	1,199	3,506	9,141	4,356	1,676	498	570	1,703	1,824	2,330	2,922
26	1,945	1,282	3,411	9,043	4,021	1,676	480	534	1,824	1,872	2,278	2,737
27	1,872	1,282	3,258	7,337	3,891	1,676	480	480	1,945	2,021	2,198	2,737
28	1,824	1,324	3,258	7,716	3,728	1,621	480	570	1,872	2,072	2,330	2,463
29	1,945	1,324	3,633	8,360	3,891	1,621	480	480	1,945	2,072	2,600	2,463
30	1,824	....	4,021	7,085	4,054	1,539	480	480	1,996	2,021	2,600	2,600
31	1,703	....	4,154	....	3,858	....	480	480	....	1,945	....	2,922

Monthly discharge of Oneida River at Caughdenoy, N. Y., for 1912.

[Drainage area, 1,377 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	3,728	1,703	2,559	1.86	2.14
February	1,621	1,019	1,343	.975	1.05
March	4,154	1,240	2,145	1.56	1.80
April	10,308	4,958	7,712	5.60	6.25
May	6,921	3,728	4,627	3.36	3.87
June	4,356	1,539	2,571	1.87	2.09
July	1,308	480	843	.612	.706
August	746	412	575	.418	.482
September	1,996	570	1,107	.804	.897
October	2,072	1,512	1,804	1.31	1.51
November	2,600	1,621	2,130	1.54	1.72
December	6,716	2,463	3,117	2.26	2.61
The year	10,308	412	2,540	1.85	25.125

SALMON RIVER AT STILLWATER BRIDGE, NEAR REDFIELD, N. Y.

Location.—On Stillwater highway bridge, 6½ miles by road east of Altmar, one-fourth mile above the proposed dam of the Ontario Power Co., seven-eighths mile below Pennock Brook (coming in from the right), and 7 miles below the mouth of North Branch (coming in from the right).

Records available.—June 24, 1911, to December 31, 1912.

Drainage area.—191 square miles.

Gage.—Chain, attached to upstream side of bridge; datum unchanged.

Channel.—Small stone and gravel.

Discharge measurements.—Made from the bridge or by wading.

Winter flow.—Relation of gage height to discharge affected by ice.

Accuracy.—Conditions for making measurements and records are good.

Cooperation.—Gage heights furnished by the Ontario Power Co., Niagara Falls, N. Y.

Discharge measurements of Salmon River at Stillwater Bridge, near Redfield, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 25[a]	Frank Weber	3.55	325
Mar. 13[a]	C. S. De Golyer	[b] 2.81	206
Apr. 16	.....do	[c] 9.76	7,040
18	.....do	[d] 7.90	4,490
Oct. 16	J. G. Mathers	2.65	312

[a] Measurements made under complete ice cover.
[b] Staff gage, 0.83.
[c] Staff gage, 4.88.
[d] Staff gage, 3.85.

Daily gage height, in feet, of Salmon River at Stillwater Bridge, near Redfield, N. Y., for 1912.

[A. Hall and Ralph Lindner, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6			5.3	5.2	4.4	1.72	1.57	1.68	4.8	2.75	2.9
2	3.5			5.4	5.1	3.8	1.70	1.55	1.72	4.9	2.95	3.6
3	3.4			5.1	5.0	4.0	1.70	1.74	1.68	3.8	2.8	7.4
4	3.2			4.8	4.6	3.7	1.70	1.82	1.86	4.4	2.65	5.5
5	3.7			4.5	4.3	3.3	1.96	1.76	1.79	4.2	2.5	4.7
6	3.6			5.8	4.5	3.0	1.84	1.71	2.35	3.3	2.5	5.2
7	3.3		3.0	7.6	4.7	2.9	1.76	1.62	2.05	2.95	3.2	5.7
8	3.4			8.2	4.2	2.65	1.70	1.61	1.98	2.65	5.7	4.6
9	3.3			7.0	4.0	2.5	1.69	1.59	1.86	2.5	5.4	3.8
10	3.5			5.9	3.8	2.4	1.64	1.93	1.92	2.7	4.6	3.7
11	3.6			5.5	3.5	2.3	1.62	2.50	2.35	2.8	3.9	3.4
12	3.4			5.0	3.5	2.25	1.62	2.25	2.65	2.75	3.5	3.5
13	3.2		2.8	5.1	4.3	2.3	1.62	2.10	2.20	3.7	3.4	3.6
14			2.8	6.4	4.3	2.25	1.77	2.00	2.00	3.3	4.6	3.6
15			3.0	9.0	3.9	2.15	1.70	1.98	1.98	2.95	4.6	3.4
16			3.8	10.0	3.7	2.2	1.92	1.82	4.00	2.65	4.2	3.4
17			3.9	9.8	5.0	2.9	1.72	1.74	2.95	2.5	3.5	3.2
18			4.3	7.9	5.5	2.55	1.64	1.74	2.50	2.4	3.3	3.1
19			4.4	8.1	4.3	2.3	1.67	1.80	2.75	2.8	3.0	4.0
20			4.5	6.2	3.9	2.15	1.64	1.77	2.45	3.4	3.0	4.3
21			4.2	5.9	6.1	2.1	1.76	1.74	2.40	3.0	3.1	4.5
22			4.2	7.0	6.4	2.05	2.35	1.84	2.35	2.7	3.3	4.7
23			4.0	10.1	5.3	1.98	1.95	1.82	2.50	3.1	3.3	3.9
24			3.9	7.0	4.3	1.92	1.80	1.85	4.70	4.2	3.2	3.7
25		3.55	3.7	5.8	4.2	1.88	1.68	1.86	4.80	5.4	3.2	3.4
26			3.3	6.2	3.6	1.84	1.66	1.88	4.20	5.0	3.1	3.7
27			3.4	7.0	3.2	1.80	1.66	2.25	3.40	4.6	3.0	3.4
28			3.6	6.8	3.0	1.78	1.63	2.05	2.85	3.9	2.8	3.0
29		3.4	4.2	5.6	5.7	1.78	1.60	1.87	3.20	3.4	2.6	3.6
30			5.0	5.0	6.6	1.75	1.60	1.76	2.80	3.0	2.4	3.3
31			5.0		5.5		1.57	1.68		2.8		3.9

NOTE.—Relation of gage height to discharge affected by ice Jan. 5 to Apr. 4.

Daily discharge, in second-feet, of Salmon River at Stillwater Bridge, near Redfield, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	598			514	1,440	985	99	72	91	1,160	340	300
2	564			532	1,360	672	95	68	99	1,220	396	564
3	532			690	1,290	754	95	103	91	672	353	3,730
4	469			840	1,040	634	95	118	126	935	313	2,050
5				985	885	500	144	106	112	840	274	1,160
6				1,960	985	410	122	97	236	500	274	1,440
7				4,040	1,100	381	106	81	166	396	469	1,870
8				4,860	840	313	95	79	151	313	1,870	1,040
9				3,260	754	274	93	75	126	274	1,600	672
10				2,050	672	249	84	140	138	326	1,040	634
11				1,690	564	224	81	274	236	353	712	532
12				1,290	564	212	81	212	313	340	564	564
13				1,360	885	224	81	177	200	634	532	598
14				2,560	885	212	108	155	155	500	1,040	598
15				5,980	712	188	95	151	151	396	1,040	532
16				7,380	634	200	138	118	754	313	840	532
17				7,100	1,290	381	99	103	396	274	564	469
18				4,440	1,690	287	84	103	274	249	500	439
19				4,720	885	224	90	114	340	353	410	754
20				2,350	712	188	84	108	262	532	410	1,160
21				2,050	2,250	177	106	103	249	410	439	985
22				3,260	2,560	166	236	122	236	326	500	540
23				7,520	1,520	151	144	118	274	439	500	712
24				3,260	885	138	114	124	1,100	840	469	634
25				1,960	840	130	91	126	1,160	1,600	469	532
26				2,350	598	122	88	130	840	1,290	439	634
27				3,260	469	114	88	212	532	1,040	410	532
28				3,020	410	110	82	166	367	381	353	410
29				1,780	1,870	110	77	128	469	249	300	410
30				1,290	2,780	104	77	106	353	410	249	500
31					1,690		72	91		353		712

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Apr. 1 to 4 determined from a rating curve based on measurements made with ice present.

Monthly discharge of Salmon River at Stillwater Bridge, near Redfield, N. Y., for 1912.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	250	1.31	1.51	C.
February	....	....	200	1.05	1.13	C.
March	....	....	323	1.69	1.95	C.
April	7,520	514	2,950	15.4	17.18	A.
May	2,780	410	1,130	5.92	6.82	A.
June	935	104	293	1.53	1.71	A.
July	286	72	101	.529	.61	B.
August	274	68	125	.654	.75	B.
September	1,160	91	333	1.74	1.94	A.
October	1,600	249	578	3.03	3.49	A.
November	1,870	249	589	3.08	3.43	A.
December	3,780	200	854	4.47	5.15	A.
The year	7,520	68	642	3.36	45.67	

NOTE.—Discharge Jan. 5 to Apr. 4 determined by means of a curve applicable to flow under ice cover, and climatologic records.

Mean discharge Jan. 5–31 estimated 210 second-feet.

SALMON RIVER NEAR PULASKI, N. Y.

Location.—At a highway bridge known locally as Fox's bridge, about 2½ miles above the village of Pulaski, 2½ miles above Trout Brook (coming in from the left), and 6½ miles above the mouth of the river.

Records available.—September 5, 1900, to June 30, 1907; August 16, 1908, to December 6, 1908; July 14, 1910, to December 31, 1912. Published in reports of the New York State engineer and surveyor, State of New York Water Supply Commission, and Conservation Commission.

Drainage area.—260 square miles[1] (measured on United States Geological Survey topographic sheets).

Gage.—A chain gage was installed July 23, 1902, the zero of which is 1.20 feet below the zero of the original staff gage, which was attached to the upstream end of the center pier of the bridge and was read from September 5, 1900, to the winter of 1901–2, when it was destroyed by ice; datum of chain gage unchanged since established.

Channel.—Gravel; fairly permanent.

Discharge measurements.—Made either by wading or from the bridge.

Winter flow.—Relation of gage height to discharge affected by ice.

Accuracy.—Open-water curve well developed. Published data considered good.

Discharge measurements of Salmon River near Pulaski, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 13	C. S. De Golyer	4.78	2,030
17	.....do	7.45	9,430
Oct. 18	J. G. Mathers	3.00	314

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[1] Drainage area revised.

Daily gage height, in feet, of Salmon River near Pulaski, N. Y., for 1912.

[Seymour J. Fox, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.45	......	......	6.6	4.6	4.35	2.60	2.40	2.50	4.5	3.22	3.15
2	3.45	......	......	5.2	4.5	3.9	2.58	2.40	2.50	4.45	3.22	3.42
3	3.35	......	......	4.9	4.5	3.85	2.58	2.60	2.50	3.9	3.25	5.9
4	3.15	......	......	4.4	4.3	3.9	2.55	2.62	2.60	4.0	3.15	5.2
5	3.10	......	......	4.5	4.1	3.65	2.60	2.55	2.60	4.1	3.15	4.5
6	3.00	......	......	5.4	4.15	3.45	2.65	2.50	3.02	3.6	3.05	4.3
7	......	......	......	6.6	4.25	3.38	2.58	2.48	3.00	3.35	3.22	4.9
8	......	......	......	6.9	4.05	3.28	2.60	2.42	2.80	3.25	5.1	4.3
9	......	......	......	5.9	3.9	3.18	2.55	2.40	2.65	3.10	4.8	3.6
10	......	......	......	5.4	3.75	3.05	2.50	2.48	2.58	3.15	4.4	3.6
11	......	......	......	5.2	3.6	3.00	2.50	3.12	2.85	3.25	4.0	3.45
12	......	......	......	4.75	3.55	3.02	2.50	2.90	3.25	3.20	3.75	3.30
13	......	......	......	4.85	4.05	3.05	2.48	2.75	2.95	3.6	3.6	3.40
14	......	......	......	5.5	4.05	3.00	2.50	2.75	2.80	3.55	4.2	3.55
15	......	......	......	7.0	3.85	2.90	2.55	2.72	2.80	3.32	4.5	3.55
16	......	......	......	7.5	3.75	2.92	2.68	2.60	3.65	3.18	4.1	3.5
17	......	......	......	7.2	4.5	3.30	2.62	2.52	3.38	3.05	3.75	3.38
18	......	......	......	6.3	4.8	3.10	2.52	2.42	3.08	2.95	3.65	3.40
19	......	......	......	6.5	4.2	3.02	2.50	2.50	3.02	3.05	3.40	4.0
20	......	......	......	5.6	3.9	2.95	2.48	2.52	3.05	3.48	3.45	4.2
21	......	......	......	5.3	5.1	2.90	2.52	2.50	3.00	3.30	3.5	4.15
22	......	......	......	5.9	5.7	2.82	2.90	2.50	2.95	3.15	3.5	3.95
23	......	......	......	7.4	4.6	2.80	2.75	2.50	2.92	3.12	3.55	3.8
24	......	......	......	6.0	4.2	2.75	2.60	2.58	4.1	3.9	3.5	3.8
25	......	......	......	5.2	4.05	2.72	2.50	2.60	4.3	4.5	3.6	3.5
26	......	......	......	5.3	3.8	2.68	2.50	2.68	4.1	4.4	3.5	3.40
27	......	......	......	5.6	3.55	2.65	2.50	2.70	3.7	4.2	3.5	3.40
28	......	......	......	5.6	3.4	2.65	2.42	2.70	3.32	3.95	3.40	3.36
29	......	......	......	4.9	4.9	2.65	2.42	2.65	3.2	3.5	3.28	3.28
30	......	......	......	4.6	5.6	2.60	2.40	2.60	3.5	3.38	3.35	3.38
31	......	......	......	......	5.2	......	2.40	2.60	......	3.22	......	3.83

NOTE.—Relation of gage height to discharge affected by ice Jan. 7 to Apr. 1.

Daily discharge, in second-feet, of Salmon River near Pulaski, N. Y., for 1912.

Day.	Jan. •	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	642	......	......	3,000	1,800	1,500	152	88	118	1,680	479	432
2	642	......	......	2,750	1,680	1,020	145	88	118	1,620	479	620
3	570	......	......	2,240	1,680	978	145	152	118	1,020	500	4,250
4	432	......	......	1,560	1,440	1,020	135	160	152	1,120	432	2,750
5	400	......	......	1,680	1,220	802	152	135	152	1,220	432	1,680
6	340	......	......	3,140	1,280	642	172	118	352	760	370	1,440
7	......	......	......	6,330	1,380	591	145	112	340	570	479	2.240
8	......	......	......	7,380	1,170	521	152	94	235	500	2,570	1,440
9	......	......	......	4,250	1,020	452	135	88	172	400	2,090	760
10	......	......	......	3,140	888	370	118	112	145	432	1,560	760
11	......	......	......	2,750	760	340	118	413	260	500	1,120	642
12	......	......	......	2,020	720	352	118	285	500	465	888	535
13	......	......	......	2,160	1,170	370	112	213	312	760	760	606
14	......	......	......	3,340	1,170	340	118	213	235	720	1,330	720
15	......	......	......	7,750	978	285	135	200	235	549	1,680	720
16	......	......	......	9,660	888	296	183	152	802	452	1,220	680
17	......	......	......	8,500	1,680	535	160	125	591	370	888	591
18	......	......	......	5,370	2,090	400	125	94	388	312	802	606
19	......	......	......	6,000	1,330	352	118	118	352	370	605	1,120
20	......	......	......	3,550	1,020	312	112	125	370	665	642	1,330
21	......	......	......	2,940	2,570	285	125	118	340	535	680	1,280
22	......	......	......	4,250	3,770	245	285	118	312	432	680	1,070
23	......	......	......	9,270	1,800	235	213	118	296	413	720	930
24	......	......	......	4,510	1,330	213	152	145	1,220	1,020	680	930
25	......	......	......	2,750	1,170	200	118	152	1,440	1,680	760	680
26	......	......	......	2,940	930	183	118	183	1,220	1,560	680	606
27	......	......	......	3,550	720	172	118	191	845	1,330	680	605
28	......	......	......	3,550	606	172	94	191	549	1,070	606	577
29	......	......	......	2,240	2,240	172	94	172	465	680	521	521
30	......	......	......	1,800	3,550	152	88	152	680	591	570	591
31	......	......	......	......	2,750	......	88	152	......	479	......	958

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Apr. 1 estimated.

Monthly discharge of Salmon River near Pulaski, N. Y., for 1912.

[Drainage area, 260 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			340	1.31	1.51	C.
February			270	1.04	1.12	C.
March			440	1.69	1.95	C.
April	9,660	1,560	4,150	16.0	17.85	B.
May	3,770	605	1,510	5.81	6.70	B.
June	1,500	152	450	1.73	1.93	B.
July	285	88	137	.527	.61	B.
August	413	88	154	.592	.68	B.
September	1,440	118	444	1.71	1.91	B.
October	1,680	312	783	3.01	3.47	B.
November	2,570	370	863	3.32	3.70	B.
December	4,250	432	1,050	4.04	4.66	B.
The year	9,660	88	879	3.38	46.09	

NOTE.—Discharge Jan. 7 to Apr. 1 estimated from the discharge at Stillwater Bridge. Mean discharge Jan. 7–31 estimated 300 second-feet.

ORWELL BROOK NEAR ALTMAR, N. Y.

Location.—At highway bridge 1½ miles by road northwest of Altmar and one-eighth mile above confluence with Salmon River.

Records available.—June 23, 1911, to December 31, 1912.

Drainage area.—22.1 square miles.

Gage.—Standard chain, attached to downstream side of bridge.

Channel.—Curved above the bridge and current rather swift; bed composed of small stone and gravel; two channels above bridge, but one at gage.

Discharge measurements.—Made by wading at low stages, from bridge at high stages.

Winter flow.—Relation of gage height to discharge affected by ice.

Accuracy.—The discharge rating curve has been fairly well developed; estimates good.

Cooperation.—Gage heights furnished by the Ontario Power Co., Niagara Falls, N. Y.

Discharge measurements of Orwell Brook near Altmar, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 13	C. S. De Golyer	3.54	204
17	do	3.96	282
Oct. 16	J. G. Mathers	2.13	26.1

Daily gage height, in feet, of Orwell Brook near Altmar, N. Y., for 1912.

[Mrs. A. G. White, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.44	......	......	3.70	2.48	2.65	1.91	1.90	1.98	3.2	2.25	2.35
2	2.87	......	......	3.75	2.42	2.5	1.90	1.90	1.99	2.68	2.25	3.15
3	2.30	......	......	3.40	2.38	2.62	1.89	2.12	2.00	2.42	2.20	3.6
4	2.44	......	......	3.20	2.34	2.51	1.90	2.02	1.98	2.60	2.18	2.85
5	2.65	......	......	3.45	2.29	2.45	1.90	2.00	2.29	2.42	2.18	2.64
6	3.20	......	......	4.40	2.38	2.35	1.89	1.98	1.98	2.32	2.18	2.70
7	3.35	......	......	5.1	2.40	2.29	1.85	1.95	1.96	2.24	2.48	2.70
8	3.10	......	......	4.7	2.34	2.24	1.85	1.95	1.95	2.18	3.1	2.58
9	3.25	......	......	4.0	2.34	2.20	1.85	1.95	1.95	2.12	2.98	2.40
10	3.25	......	......	3.75	2.32	2.16	1.84	2.02	2.02	2.20	2.69	2.45
11	3.20	......	......	3.55	2.28	2.15	1.85	2.10	2.25	2.20	2.48	2.35
12	3.10	......	......	3.40	2.32	2.15	1.85	2.02	2.20	2.25	2.40	2.38
13	......	......	......	3.65	2.5	2.14	1.82	2.00	2.12	2.32	2.40	3.0
14	......	......	3.95	4.1	2.48	2.12	1.91	2.10	2.04	2.22	3.15	2.72
15	......	......	3.85	4.9	2.38	2.09	1.85	2.02	2.16	2.18	3.05	2.62
16	......	......	3.65	4.7	2.48	2.14	1.88	2.00	2.32	2.14	2.68	2.60
17	......	......	2.65	4.2	2.82	2.35	1.82	1.98	2.18	2.12	2.55	2.52
18	......	......	2.80	3.55	2.72	2.18	1.82	2.00	2.20	2.20	2.55	2.32
19	......	......	2.88	3.7	2.51	2.10	1.82	2.08	2.22	2.22	2.40	3.1
20	......	......	2.90	3.1	2.46	2.10	1.82	2.01	2.12	2.20	2.40	2.78
21	......	......	2.95	2.99	3.45	2.09	1.98	1.98	2.08	2.15	2.38	2.70
22	......	......	2.95	3.20	3.30	2.04	2.00	1.98	2.05	2.15	2.35	2.62
23	......	......	2.86	4.0	2.70	2.00	1.92	1.98	2.30	2.15	2.35	2.55
24	......	......	2.62	3.3	2.68	2.00	1.90	2.00	2.52	2.40	2.38	2.55
25	......	......	2.55	2.98	2.59	2.00	1.84	2.00	2.72	2.78	2.40	2.50
26	......	......	2.46	2.79	2.44	1.96	1.86	2.00	2.45	2.75	2.45	2.45
27	......	......	2.46	2.72	2.34	1.95	1.85	2.15	2.32	2.70	2.42	2.38
28	......	......	2.58	2.62	2.29	1.95	1.82	2.12	2.22	2.52	2.34	2.30
29	......	......	3.00	2.61	3.5	1.95	1.85	2.02	2.22	2.44	2.31	2.48
30	......	......	3.45	2.58	3.32	1.92	1.85	2.00	2.0	2.32	2.35	2.40
31	......	......	3.50	......	2.98	......	1.86	1.98	......	2.25	......	2.65

NOTE.—Relation of gage height to discharge affected by ice Jan. 13 to some time in March.

Daily discharge, in second-feet, of Orwell Brook near Altmar, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	......	232	54	72	13	13	16	149	34	42
2	......	......	......	241	49	56	13	13	17	76	34	142
3	......	......	......	181	45	68	13	24	17	49	30	215
4	......	......	......	149	42	57	13	18	16	66	29	98
5	......	......	......	190	37	52	13	17	37	49	29	71
6	......	......	......	368	45	42	13	16	16	40	29	73
7	......	......	......	520	47	37	11	15	15	33	53	73
8	......	......	......	431	42	33	11	15	15	29	134	64
9	......	......	......	288	42	30	11	15	15	24	116	47
10	......	......	......	241	40	27	11	18	18	30	77	52
11	......	......	......	406	36	26	11	23	34	30	54	42
12	......	......	......	181	40	26	11	18	30	34	47	45
13	......	......	......	224	56	26	10	17	24	40	47	119
14	......	......	......	307	54	24	13	23	19	32	142	81
15	......	......	......	475	45	22	11	18	27	29	126	68
16	......	......	......	431	54	26	12	17	40	26	76	66
17	......	......	......	327	94	42	10	16	29	24	61	58
18	......	......	......	206	81	29	10	17	30	30	61	40
19	......	......	......	232	57	23	10	22	32	32	47	134
20	......	......	......	134	52	23	10	18	24	30	47	88
21	......	......	......	118	190	22	16	16	22	26	45	73
22	......	......	......	149	165	19	17	16	20	26	42	68
23	......	......	......	288	78	17	14	16	38	26	42	61
24	......	......	......	165	76	17	13	17	58	47	45	61
25	......	......	......	116	65	17	11	17	81	88	47	56
26	......	......	......	90	51	15	11	17	52	84	52	52
27	......	......	......	81	42	15	11	26	40	78	49	45
28	......	......	......	68	37	15	10	24	32	58	42	38
29	......	......	......	67	198	15	11	18	32	51	39	54
30	......	......	......	64	168	14	11	17	17	40	42	47
31	......	......	......	......	116	......	11	16	......	34	......	72

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Orwell Brook near Altmar, N. Y., for 1912.

[Drainage area, 22.1 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
April	520	64	232	10.5	11.71	B.
May	198	36	70.9	3.21	3.70	A.
June	72	14	30.2	1.37	1.53	B.
July	17	10	11.8	.539	.62	B.
August	26	13	17.8	.813	.94	B.
September	81	15	28.8	1.32	1.47	B.
October	149	24	45.5	2.06	2.38	A.
November	142	29	57.3	2.59	2.89	A.
December	215	38	72.9	3.30	3.80	A.

BLACK RIVER NEAR BOONVILLE, N. Y.

Location.—At highway bridge 2 or 3 miles northeast of Boonville, an equal distance by river downstream from Hawkinsville, and about 1 mile above the mouth of Sugar River, a small tributary from the left.

Records available.—February 16, 1912, to December 31, 1912, data also published in first annual report of Conservation Commission, State of New York.

Drainage area.—303 square miles.

Gage.—Standard chain, fastened to the downstream side of the bridge. A staff gage, reading from 6 to 13 feet, is fastened to the downstream right-hand abutment and is used for high-water readings.

Channel.—Rough and bowldery; practically permanent.

Discharge measurements.—At high stages from a cable about one-quarter mile above the gage; at low stages, by wading near the cable section.

Winter flow.—Relation of gage height to discharge affected by ice.

Diversions.—A portion of the flow of Black River is diverted past the gaging station through a feeder which takes water at the State dam at Forestport and delivers its flow to the summit level of the Black River canal at Boonville. A portion of the flow passes northward, supplying the Black River canal from Boonville, to the head of slack-water navigation at the foot of Lyon Falls. The remainder is diverted from the drainage basin and flows into the Erie Canal at Rome. To determine the amount diverted past the station and out of the drainage basin measurements are made in the Forestport feeder at a farm bridge near Speny Hill, 1 mile northeast of Boonville. Measurements of northward flow in the Black River canal are made at a farm bridge half a mile north of Boonville; measurements of the southward flow at a farm bridge about three-fourths of a mile southeast from Boonville. The Forestport feeder is open for service about May 1 for the purpose of feeding the Erie Canal, which opens about May 15, although the Black River canal does not open until later. When navigation is closed on the Erie Canal the feeder gates are closed also and the surplus water runs over the dam into Black River. Some water leaks through the feeder gates and flows through the feeder into Lansing Kill and Mohawk River. Results of measurements made at this place in the past are published in reports of the State engineer and surveyor of New York.

Storage.—A reservoir built by the State at Forestport about 8 miles upstream, stores about 2,000,000,000 cubic feet. About a mile above the station is a site of which a dam 110 feet high would impound 3,300,000,000 cubic feet of water.

Accuracy.—A well-defined discharge rating curve has been developed. The records do not give the total discharge of the drainage area. See "Diversions."

Discharge measurements of Black River near Boonville, N. Y., in 1912.

Date.		Hydrographer.	Gage height.	Discharge.
			Feet.	*Sec.-ft.*
Feb.	3[a]	G. H. Canfield	5.66	354
	15[b]	Frank Weber	5.03	255
Apr.	15	C. S. DeGolyer	8.67	3,560
	15	.....do	8.93	4,060
	22	.....do	8.00	2,750
May	21	Frank Weber	7.15	1,970
July	26[c]	G. J. Lyon	3.32	55.1
	28[c]	.....do	3.27	46.2
Oct.	27	J. G. Mathers	5.35	544

[a] Measurement made under complete ice cover at cable.
[b] Measurement made at wading section, 200 feet above bridge, under complete ice cover.
[c] Measurements made by wading 160 feet below cable.

Discharge measurements of Forestport feeder near Boonville, N. Y., in 1912.

Date.		Hydrographer.	Gage height.[a]	Discharge.
			Feet.	*Sec.-ft.*
July	26	G. J. Lyon	1.31	[b] 215
Oct.	27[c]	J. G. Mathers	1.02	[b] 275

[a] Distance from reference point to water surface. Reference point is top of mudsill at left, upstream side of bridge.
[b] Amount of water diverted from Black River above the gaging station.
[c] No flow northward in Black River canal at the time this measurement was made.

Discharge measurements of Black River canal (south) at Boonville, N. Y., in 1912.

Date.		Hydrographer.	Gage height.[a]	Discharge.
			Feet.	*Sec.-ft.*
July	26	G. J. Lyon	0.88	[b] 155
Oct.	27	J. G. Mathers	1.05	[b] 234

[a] Distance from reference point to water surface. Reference point is top of mudsill at right upstream side of bridge.
[b] Amount of water diverted permanently to Erie Canal.

Daily gage height, in feet, of Black River near Boonville, N. Y., for 1912.

[W. D. Charbonneau, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	5.8	5.6	6.7	7.3	7.5	3.52	3.28	3.18	4.45	4.55	4.7
2	5.5	5.65	5.6	6.8	7.6	6.8	3.42	3.28	3.32	5.35	4.9	5.25
3	5.4	5.7	5.5	7.0	7.6	6.2	3.35	3.32	3.72	5.45	5.45	6.4
4	5.3	5.65	5.6	7.2	7.8	6.0	3.48	3.32	3.72	5.5	5.6	7.0
5	5.3	5.5	5.3	7.1	6.7	6.6	3.42	3.38	3.70	5.35	5.55	6.4
6	4.95	5.4	5.25	7.3	6.2	5.9	3.32	3.28	3.70	4.95	5.4	6.2
7	5.0	5.5	5.2	8.0	6.1	5.4	3.38	3.26	3.52	4.7	5.45	6.3
8	5.45	5.45	5.3	8.7	6.2	4.95	3.48	3.28	3.56	4.6	6.2	6.2
9	5.3	5.2	5.2	8.6	6.2	4.6	3.40	3.28	3.48	4.5	6.8	6.3
10	5.9	5.35	5.25	7.8	6.0	4.32	3.42	3.35	3.40	4.7	6.5	6.0
11	6.0	5.25	5.2	7.2	5.7	4.25	3.32	3.38	3.42	4.6	6.4	5.6
12	6.1	5.2	5.15	6.9	5.55	4.22	3.38	3.38	3.42	4.5	6.2	5.65
13	6.2	5.15	5.1	6.8	5.55	4.12	3.32	3.38	3.28	4.6	5.4	5.55
14	6.3	5.1	5.15	7.1	6.2	4.18	3.32	3.32	3.26	4.4	5.7	5.5
15	6.4	5.0	5.5	8.7	6.1	4.22	3.32	3.39	3.62	4.5	5.55	5.3
16	6.0	5.0	7.6	9.9	5.9	3.92	3.28	3.48	5.15	4.48	4.7	5.25
17	6.3	5.2	8.3	10.4	6.4	3.72	3.32	3.35	5.3	4.42	4.95	5.3
18	6.3	5.2	9.3	9.7	6.2	3.67	3.32	3.32	5.2	4.22	5.35	5.35
19	6.4	5.3	8.8	9.2	6.1	3.58	3.38	3.38	5.0	4.10	5.7	6.2
20	6.5	5.5	8.1	8.3	6.1	3.42	3.32	3.30	5.1	4.45	5.6	6.3
21	6.4	6.0	7.7	8.0	7.2	3.32	3.45	3.22	5.0	4.6	5.6	6.4
22	6.5	6.4	7.0	8.1	7.8	3.18	3.65	3.22	5.0	4.48	5.6	5.8
23	6.3	6.2	6.9	9.9	7.4	3.30	3.68	3.32	4.9	4.44	5.6	5.6
24	5.9	6.2	6.6	9.2	7.0	3.42	3.55	3.35	4.95	4.6	5.6	5.65
25	5.65	6.3	6.5	8.3	6.4	3.58	3.42	3.32	5.25	5.0	5.5	5.8
26	5.5	6.2	6.3	7.8	6.2	3.52	3.32	3.38	5.45	5.4	5.55	5.5
27	5.5	6.4	6.0	7.8	6.2	3.72	3.22	3.28	5.3	5.4	5.4	5.3
28	5.6	6.1	6.1	8.1	6.1	3.62	3.22	3.28	5.35	5.2	5.15	5.4
29	5.6	5.7	6.2	7.7	6.5	3.52	3.32	3.22	5.1	5.0	5.0	5.15
30	5.9	....	6.3	7.2	8.1	3.58	3.22	3.12	4.75	4.7	4.9	5.3
31	5.8	....	6.6	....	8.1	....	3.18	3.22	....	4.6	....	5.7

NOTE.—Relation of gage height to discharge affected by ice Jan. 8 to Mar. 19.

Daily discharge, in second-feet, of Black River near Boonville, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	795	373	341	1,460	2,050	2,270	74	49	40	238	262	305
2	630	349	341	1,540	2,380	1,540	63	49	53	558	370	512
3	580	357	325	1,740	2,380	1,060	56	58	100	605	605	1,210
4	535	349	341	1,940	2,050	920	70	58	100	630	680	1,740
5	535	325	295	1,840	1,460	1,370	63	59	97	558	655	1,210
6	390	310	288	2,050	1,060	855	53	49	97	390	580	1,060
7	410	325	280	2,860	990	580	59	47	74	305	605	1,140
8	520	318	295	3,750	1,060	390	70	49	79	275	1,060	1,060
9	430	280	280	3,620	1,060	275	61	49	70	250	1,540	1,140
10	570	302	288	2,620	920	209	63	56	61	305	1,290	920
11	550	288	280	1,940	735	194	53	59	63	275	1,210	680
12	540	280	272	1,640	655	188	59	59	63	250	1,060	708
13	530	272	265	1,540	655	168	53	59	49	275	580	655
14	520	265	272	1,840	1,060	180	58	53	47	227	735	630
15	520	250	325	3,750	990	188	53	60	87	250	655	535
16	420	250	856	5,380	855	131	49	70	470	245	305	512
17	456	280	1,390	6,100	1,210	100	53	56	535	232	390	535
18	456	280	1,920	5,100	1,060	93	53	53	490	188	558	558
19	473	295	2,450	4,410	990	82	59	59	410	164	735	1,060
20	490	325	2,980	3,240	990	63	53	51	450	238	680	1,140
21	473	405	2,500	2,860	1,940	53	66	44	410	275	680	1,210
22	490	473	1,740	2,980	2,620	40	90	44	410	245	680	795
23	456	439	1,640	5,380	2,160	51	94	53	370	236	680	680
24	389	439	1,370	4,410	1,740	63	78	56	390	275	680	706
25	349	456	1,290	3,240	1,210	82	63	53	512	410	630	795
26	325	439	1,140	2,620	1,060	74	53	59	605	580	655	630
27	325	473	920	2,620	1,060	100	44	49	535	580	580	535
28	341	422	990	2,980	990	87	44	49	558	490	470	580
29	341	357	1,060	2,500	1,290	74	53	44	450	410	410	470
30	389	....	1,140	1,940	2,980	82	44	36	320	305	370	535
31	373	....	1,370	....	2,980	....	40	44	....	275	....	735

NOTE.—Daily discharge Jan. 17 to Mar. 15 determined from a rating curve based on two measurements made when ice was present. Discharge Jan. 8 to 16, and Mar. 16 to 19, estimated by making a gradual change between the open water and ice curves. Discharge during open-water period determined from a rating curve fairly well defined below 4,100 second-feet.

Monthly discharge of Black River near Boonville, N. Y., for 1912.

[Drainage area, 303 square miles.]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	795	325	471	C.
February	473	250	344	C.
March	2,980	265	943	C.
April	6,100	1,460	3,000	A.
May	2,980	655	1,440	A.
June	2,270	40	385	A.
July	94	40	59.3	A.
August	70	36	52.0	A.
September	605	40	266	A.
October	630	164	340	A.
November	1,540	262	680	A.
December	1,740	305	806	A.
The year	6,100	36	730	

BLACK RIVER NEAR FELTS MILLS, N. Y.

Location.—At the dam of the Lefevre Paper Co., formerly owned by the Black River Traction Co., about 1½ miles above the village of Felts Mills. The dam is 9 miles upstream from Watertown and 7 miles upstream from the old Huntingtonville gaging station.

Records available.—February, 1897, to December, 1901, at Huntingtonville dam, August 29, 1902, to December 31, 1912, at Felts Mills. Data also in annual reports of the State engineer and surveyor, State of New York.

Drainage area.—1,851 square miles.

Gage.—Vertical staff, attached to a crib at the left-hand side of the stream above the mill; correction is made to gage readings for velocity of approach during the high water.

Discharge.—Previous to August 16, 1910, records were kept of the flow over a dam about 100 feet upstream from the paper mill. This dam was of sawed timber resting on a limestone foundation and its main crest was 380.6 feet long. During the summer of 1910 a new concrete dam was constructed about 100 feet downstream. This dam has a main crest for low and medium stages 300.45 feet long and 3.75 feet wide. Upstream face vertical; downstream semiogee section. Main crest of dam about 6 feet high. On the right-hand side is an additional section, of greater elevation, 48.2 feet long; on the left-hand side, angling upstream, is a section 139.7 feet long, making the total length of the dam for high-water discharge approximately 488.4 feet. A wood-pulp mill constructed at the left-hand end of the dam has been in operation since 1907. The mill contains one 45-inch and four 72-inch Smith-McCormick turbines. The discharge over the spillways has been calculated by means of the weir formula, using coefficients derived from experiments by the United States Geological Survey on a dam of similar cross section. Record is kept of the hours run and of the gate opening of each wheel as well as the head under which the turbines operate.

Winter flow.—Affected by ice. No correction attempted.

Artificial control.—Power plants and storage above the station.

Accuracy.—Results believed to be good for a station of this type.

Cooperation.—Records obtained and computations made by engineers of the New York State engineer's department, which furnishes the data to the Survey.

Daily discharge, in second-feet, of Black River near Felts Mills, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,054	1,599	2,394	7,148	10,168	13,735	1,148	951	[a]1,240	1,988	2,355	[a]1,405
2	3,251	1,760	2,192	8,120	9,024	[a]13,201	1,116	951	1,491	5,467	2,589	2,029
3	3,340	1,798	[a]2,434	8,120	8,120	10,719	1,320	741	1,435	3,396	[a]2,738	6,706
4	3,431	[a]1,814	1,509	8,612	7,490	9,269	467	[a]788	1,816	2,754	3,105	6,444
5	3,348	1,311	1,826	7,961	[a]6,232	7,490	1,341	1,159	2,001	3,053	2,754	6,188
6	2,105	2,463	1,614	11,476	5,606	5,644	1,116	923	1,759	[a]1,941	2,509	6,315
7	[a]2,600	2,647	2,105	[a]24,751	5,766	4,480	[a]1,006	1,309	1,653	2,002	2,355	6,188
8	1,515	2,647	1,983	22,505	5,418	3,741	1,367	1,127	[a]1,322	2,075	5,344	[a]5,226
9	1,986	2,233	1,983	19,643	5,529	[a]3,028	1,116	826	1,399	2,015	5,603	5,088
10	2,055	2,325	[a]2,128	17,362	4,991	2,876	1,213	1,161	1,309	1,705	[a]4,216	3,778
11	1,635	[a]1,881	1,387	15,234	4,653	3,107	1,116	[a]931	1,361	1,705	4,762	3,384
12	1,696	1,619	1,812	12,429	[a]3,830	2,876	1,116	1,213	1,116	1,816	3,988	3,197
13	1,696	2,192	1,812	10,982	3,267	2,381	1,116	923	1,341	[a]2,035	3,384	2,355
14	[a]2,405	2,325	1,470	[a]12,565	4,385	2,381	[a]859	1,358	1,341	2,431	3,578	2,280
15	1,184	2,325	1,758	11,981	5,058	2,274	1,514	1,182	[a]1,240	2,208	3,880	[a]1,848
16	1,957	2,192	1,812	16,179	4,480	[a]1,916	1,309	1,161	1,494	2,137	3,677	2,431
17	1,986	1,942	[a]3,202	24,592	4,953	1,853	1,116	1,349	2,355	2,002	[a]2,844	2,280
18	2,055	[a]2,353	2,971	28,033	6,232	1,799	1,213	[a]859	2,509	1,938	3,105	2,208
19	1,725	1,430	4,669	27,574	[a]6,365	1,899	1,116	917	2,137	1,816	2,800	2,840
20	2,267	2,128	5,410	22,231	6,499	2,355	1,083	923	1,876	[a]1,848	2,714	3,197
21	[a]3,083	2,128	5,525	[a]20,180	8,612	2,469	[a]1,160	923	2,069	2,137	2,906	3,197
22	2,492	2,064	5,190	14,580	9,980	1,759	1,514	983	[a]1,491	2,208	2,631	[a]2,844
23	3,106	2,606	4,977	14,786	10,345	[a]1,082	1,309	951	1,588	2,069	2,431	3,015
24	2,947	2,606	[a]5,294	18,242	10,532	1,148	1,367	951	1,876	1,938	[a]2,429	2,315
25	2,647	[a]2,827	3,749	19,899	10,168	1,435	1,271	[a]931	2,069	3,196	2,714	2,035
26	1,197	2,033	3,919	16,410	[a]8,779	1,174	1,224	1,341	2,355	4,748	2,450	2,754
27	2,259	2,606	3,348	13,482	7,961	1,367	1,165	1,341	2,753	[a]3,508	2,714	2,208
28	[a]2,273	2,606	3,348	[a]11,629	6,499	1,341	[a]720	1,116	2,678	4,339	2,800	2,137
29	878	2,463	4,385	11,436	7,069	1,320	981	1,387	[a]1,405	3,384	2,260	[a]1.082
30	1,942	....	5,606	11,244	9,801	[a]931	937	1,399	1,876	2,840	2,097	1.836
31	1,717	....	[a]8,507	....	12,029	....	969	1,309	....	2,671	....	2.335

[a] Sunday.

Monthly discharge of Black River near Felts Mills, N. Y., for 1912.

[Drainage area, 1,851 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)
	Maximum.	Minimum.	Mean.	Per square mile.	
January	3,431	878	2,253	1.22	1.41
February	2,827	1,311	2,170	1.17	1.26
March	8,507	1,387	3,236	1.75	2.02
April	28,033	7,148	15,646	8.45	9.43
May	12,029	3,267	7,092	3.83	4.42
June	13,735	931	3,685	1.99	2.22
July	1,514	720	1,141	.616	.710
August	1,399	741	1,077	.582	.671
September	2,753	1,116	1,745	.943	1.05
October	5,467	1,705	2,559	1.38	1.59
November	5,603	2,097	3,129	1.69	1.89
December	6,706	1,082	3,263	1.76	2.03
The year	28,033	720	3,900	2.11	28.701

MOOSE RIVER AT MOOSE RIVER, N. Y.

Location.—In the village of Moose River, about 3 miles downstream from McKeever station on the Adirondack division of the New York Central & Hudson River Railroad, 5 miles below the mouth of South Branch of Moose River (coming in from the left), and nearly 20 miles above the junction of Black and Moose rivers at Lyons Falls.

Records available.—June 5, 1900, to December 31, 1912. Data also in annual reports of the New York State engineer and surveyor and State Water Supply Commission of New York.

Drainage area.—370 square miles (revised; measured on United States Geological Survey topographic sheets).

Gage.—Staff, in two sections, fastened to the left bank a short distance above cable; read twice daily. The elevation of the gage zero was changed February 28, 1903, from 15.36 to 15.53.

Channel.—Composed of cobble and bowlders; fairly permanent; current smooth; depth comparatively uniform. Just above the station is a small island on which ice and log jams occasionally form. Velocity from dam at McKeever to the station relatively slow; below the station velocity very high.

Discharge measurements.—Made from a cable (erected July, 1903), which has a clear span of 269 feet.

Artificial control.—A timber dam at McKeever is used for power and for the regulation of flow for log driving. During portions of the year, therefore, two gage readings a day may not give a representative mean.

Winter flow.—The stream freezes over in winter and is covered with alternate layers of ice and snow which render the determination of discharge difficult.

Accuracy.—Discharge rating curve for open channel fairly accurate. Published data for periods of open water considered good.

Discharge measurements of Moose River at Moose River, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 16[a]	Frank Weber	1.90	310
17[a]	.....do	2.36	408
Apr. 20[b]	C. S. De Golyer	6.00	3,710
20	.....do	5.75	3,930
Oct. 25	Frank Weber	4.20	2,120

[a] Measurement made under complete ice cover.

[b] Results doubtful, owing to logs interfering with work. Probably backwater effect.

Daily gage height, in feet, of Moose River at Moose River, N. Y., for 1912.

[Chris Hannan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	......	......	......	4.6	4.4	0.6	0.8	0.25	1.6	3.0	1.8
2	2.8	......	2.6	......	4.3	3.8	.9	.7	.65	1.8	3.6	2.8
3	2.7	0.9	......	......	4.6	3.3	.6	.9	1.15	1.9	3.4	4.1
4	2.6	......	......	......	4.4	3.0	.0	.9	1.1	2.0	3.2	4.0
5	2.4	......	......	......	4.2	2.6	.5	.8	.95	1.6	2.8	3.4
6	2.2	......	......	3.9	4.0	2.3	.55	.9	.9	1.6	2.5	2.8
7	2.0	......	......	......	3.8	2.4	.65	.8	1.05	1.45	3.5	2.4
8	2.4	......	......	......	3.8	2.2	.75	.8	1.0	1.4	4.9	2.0
9	2.6	......	2.5	......	3.6	2.0	.8	.7	1.1	1.3	4.7	1.7
10	2.5	.8	......	......	3.2	2.0	.7	.7	1.0	1.4	4.1	1.6
11	2.5	......	......	......	3.0	1.9	.7	.8	.9	1.5	3.1	1.6
12	2.4	......	......	......	3.0	1.7	.6	.8	.85	1.6	2.8	1.8
13	2.6	......	......	2.6	2.9	1.5	.5	.8	.0	1.8	2.4	1.9
14	2.7	......	......	3.0	3.0	1.2	.0	.75	.6	2.0	2.2	2.0
15	......	......	......	4.6	2.9	.85	.5	.9	.95	2.0	2.8	2.2
16	......	1.9	3.0	7.8	2.9	.00	.65	.8	1.4	2.0	2.8	2.4
17	......	2.2	......	8.5	3.5	1.05	.7	.7	1.8	1.9	2.4	2.4
18	......	......	......	7.5	3.8	1.1	.8	.9	1.6	1.8	2.0	2.2
19	......	......	......	6.7	3.8	1.35	.8	.8	1.6	1.8	2.0	1.9
20	2.2	......	......	5.6	4.1	1.3	.8	.65	1.45	1.9	2.0	1.8
21	......	......	......	5.4	4.6	1.25	.75	.5	1.35	1.8	2.0	1.8
22	......	......	......	5.7	5.0	.95	.95	.0	1.45	2.0	2.0	2.2
23	......	......	3.1	9.0	4.8	1.05	.9	.6	1.8	2.0	2.0	2.4
24	......	2.3	......	6.4	4.4	1.0	.9	.65	2.0	2.8	2.0	2.2
25	......	......	......	5.4	3.9	.95	.95	.8	2.0	3.8	2.0	2.4
26	......	......	......	5.2	3.6	.95	1.0	1.35	2.0	3.9	1.9	2.4
27	.9	......	......	5.4	3.7	.85	.9	1.1	2.2	3.6	2.0	2.2
28	......	......	......	5.8	4.0	.8	.25	1.0	2.2	3.4	1.8	2.0
29	......	......	......	5.6	4.4	.7	.6	1.0	1.9	3.1	1.8	2.2
30	......	......	3.1	4.7	5.7	.00	.8	1.1	1.6	3.0	1.9	2.4
31	......	......	......	......	5.0	......	.8	.75	......	2.8	......	2.4

NOTE.—Relation of gage height to discharge affected by ice Jan. 9 to Apr. 12.

Daily discharge, in second-feet, of Moose River at Moose River, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,150	......	......	......	2,500	2,300	195	240	128	465	1,150	535
2	1,020	......	......	......	2,210	1,760	265	215	205	535	1,590	1,020
3	965	......	......	......	2,500	1,360	195	265	330	570	1,430	2.030
4	910	......	......	......	2,300	1,150	90	265	315	610	1,290	1,940
5	800	......	......	......	2,120	910	175	240	278	465	1,020	1,430
6	700	......	......	......	1,940	750	185	265	265	465	855	1,020
7	610	......	......	......	1,760	800	205	240	302	420	1,510	800
8	595	......	......	......	1,760	700	228	240	290	405	2,810	610
9	......	......	......	......	1,590	610	240	215	315	375	2,600	500
10	......	......	......	......	1,290	610	215	215	290	405	2,030	465
11	......	......	......	......	1,150	570	215	240	265	435	1,220	465
12	......	......	......	......	1,150	500	195	240	252	465	1,020	535
13	......	......	......	910	1,080	435	175	240	90	535	800	570
14	......	......	......	1,150	1,150	345	90	228	195	610	700	610
15	......	......	......	2,500	1,080	252	175	265	278	610	1,020	700
16	......	......	......	6,220	1,080	90	205	240	405	610	1,020	800
17	......	......	......	7,060	1,510	302	215	215	535	570	800	800
18	......	......	......	5,860	1,760	315	240	265	465	535	610	700
19	......	......	......	4,900	1,760	390	240	240	465	535	610	570
20	......	......	......	3,580	2,030	375	240	205	420	570	610	535
21	......	......	......	3,360	2,500	360	228	175	390	535	610	535
22	......	......	......	3,700	2,920	278	278	90	420	610	610	700
23	......	......	......	7,660	2,700	302	265	195	535	610	610	800
24	......	......	......	4,540	2,300	290	265	205	610	1,020	610	700
25	......	......	......	3,360	1,850	278	278	240	610	1,760	610	800
26	......	......	......	3,140	1,590	278	290	390	610	1,850	570	800
27	......	......	......	3,360	1,670	252	265	315	700	1,590	610	700
28	......	......	......	3,820	1,940	240	128	290	700	1,430	535	610
29	......	......	......	3,580	2,300	215	195	290	570	1,220	535	700
30	......	......	......	2,600	3,700	90	240	315	465	1,150	570	800
31	......	......	......	......	2,920	......	240	228	......	1,020	......	800

NOTE.—Daily discharge Jan. 1-8 and Apr. 13 to Dec. 31 determined from a well-defined rating curve.

Monthly discharge of Moose River at Moose River, N. Y., for 1912.

[Drainage area, 370 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,150	130	482	1.30	1.50	D.
February	440	115	268	.724	.78	D.
March	640	440	535	1.45	1.67	D.
April	7,660	680	2,700	7.30	8.14	C.
May	3,700	1,080	1,940	5.24	6.04	B.
June	2,300	90	570	1.54	1.72	B.
July	290	90	215	.581	.67	B.
August	390	90	242	.654	.75	B.
September	700	90	390	1.05	1.17	B.
October	1,850	375	741	2.00	2.31	B.
November	2,810	535	1,020	2.76	3.08	B.
December	2,030	465	793	2.14	2.47	B.
The year	7,660	90	824	2.23	30.30	

NOTE.—Discharge Jan. 8 to Apr. 12 estimated by means of an ice rating curve, observer's notes, and climatologic records.

MIDDLE BRANCH OF MOOSE RIVER AT OLD FORGE, N. Y.

Location.—About 300 feet below the highway bridge in Old Forge and about 400 feet below the dam.

Records available.—November 9, 1911, to December 31, 1912; published also in annual report of New York State Conservation Commission.

Drainage area.—51.5 square miles.

Gage.—Vertical staff, graded to feet and tenths, reading from 1 foot to 7 feet, spiked to birch tree on left bank of stream 300 feet below highway bridge.

Channel.—Fairly straight from dam to a point about 200 feet below the gage, where the river turns abruptly to the right and flows over a rock reef, which is the control point for the gage. Channel fairly uniform from dam to point of control. Right bank high and wooded; left bank from the highway bridge to within about 50 feet of the gage, defined by a stone wall about 3 feet above ordinary low water.

Discharge measurements.—Made from the highway bridge at high stages and by wading opposite the fish hatchery at medium and low stages.

Winter flow.—The river is kept open throughout the year by the State fish hatchery just above the station.

Accuracy.—Rating curve fairly well developed. Estimates good.

Discharge measurements of Middle Branch of Moose River at Old Forge, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 26	G. H. Canfield	1.20	174
Apr. 19[a]	C. S. De Golyer	3.61	142
19[a]	....do	3.96	342

[a] Backwater at gage from North Branch of Moose River.

Daily gage height, in feet, of Middle Branch of Moose River at Old Forge, N. Y., for 1912.

[Vernon S. Ervin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.75	1.20	2.32	1.00	3.4	3.6	1.42	2.0	2.1	2.1	2.45	2.4
2	2.75	1.90	2.32	1.00	3.0	2.75	1.75	2.0	2.1	2.1	2.45	2.4
3	2.75	2.60	2.32	1.00	2.7	2.65	1.75	2.0	2.1	2.1	2.45	2.4
4	2.75	2.60	2.32	1.00	2.0	2.0	1.75	2.0	2.1	2.1	2.45	2.4
5	2.70	2.60	2.30	1.00	1.85	1.80	1.75	2.0	2.1	2.1	2.45	2.4
6	2.70	1.9	2.30	1.00	2.3	1.80	1.75	2.0	2.1	2.1	2.45	2.4
7	2.70	1.2	2.30	1.00	2.7	1.80	1.75	2.0	2.1	2.1	2.45	2.4
8	1.85	1.2	2.30	1.00	2.7	1.80	1.75	2.0	2.1	2.1	2.45	2.4
9	1.00	1.65	2.30	1.00	2.3	1.80	1.75	2.0	2.1	2.1	2.45	2.4
10	1.00	2.1	2.29	1.00	2.0	1.80	1.75	2.0	2.1	2.1	2.45	2.4
11	1.00	2.1	2.28	1.02	2.2	1.80	1.75	2.0	2.1	2.1	2.45	2.4
12	1.68	2.1	2.28	1.15	2.45	1.80	1.75	2.0	2.1	2.1	2.45	2.4
13	2.35	2.1	2.28	1.21	2.7	1.45	1.75	1.96	2.1	2.1	2.45	2.4
14	2.35	2.25	2.28	1.44	2.45	1.10	1.75	1.92	2.1	2.1	2.45	2.4
15	2.35	2.4	2.28	1.74	2.2	1.10	1.75	1.46	2.1	2.1	2.45	2.4
16	2.35	2.4	2.28	2.55	2.45	1.10	1.75	1.0	2.1	2.1	2.45	2.4
17	2.35	2.4	2.28	4.1	2.7	1.45	1.75	1.0	2.1	2.1	2.45	2.4
18	2.35	2.4	2.25	4.4	2.7	1.80	1.75	1.0	2.1	2.1	2.45	2.4
19	2.35	2.4	2.25	4.1	2.7	1.80	1.75	1.0	2.1	2.1	2.45	2.4
20	2.35	2.35	1.68	4.0	2.8	1.80	1.75	1.0	2.1	2.1	2.45	2.4
21	2.35	2.35	1.00	3.6	3.2	1.80	1.75	1.0	2.1	2.1	2.4	2.4
22	1.68	2.35	1.00	3.8	3.7	1.45	1.88	1.0	2.1	2.1	2.4	2.4
23	1.00	2.35	1.00	4.4	3.8	1.10	2.0	1.92	2.1	2.1	2.4	2.4
24	1.05	2.34	1.00	4.8	3.8	1.10	2.0	1.92	2.1	2.3	2.4	2.4
25	1.10	2.32	1.00	4.6	3.4	1.10	2.0	1.92	2.1	2.45	2.4	2.4
26	1.20	2.32	1.00	4.4	3.0	1.10	2.0	2.01	2.1	2.45	2.4	2.4
27	1.20	2.32	1.00	4.2	2.05	1.10	2.0	2.1	2.1	2.45	2.4	2.4
28	1.20	2.32	1.00	4.1	1.10	1.10	2.0	2.1	2.1	2.45	2.4	2.4
29	1.20	2.32	1.00	4.0	2.5	1.10	2.0	2.1	2.1	2.45	2.4	2.4
30	1.20	....	1.00	3.8	3.9	1.10	2.0	2.1	2.1	2.45	2.4	2.4
31	1.20	....	1.00	....	3.9	....	2.0	2.1	....	2.45	....	2.4

NOTE.—No backwater from ice during 1912. High water in the North Branch caused backwater at the gage Apr. 17 to 19.

Daily discharge, in second-feet, of Middle Branch of Moose River at Old Forge, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	204	17	130	10	328	368	28	84	98	98	152	143
2	204	72	130	10	251	204	56	84	98	98	152	143
3	204	177	130	10	195	186	56	84	98	98	152	143
4	204	177	130	10	84	84	56	84	98	98	152	143
5	195	177	127	10	66	61	56	84	98	98	152	143
6	195	72	127	10	127	61	56	84	98	98	152	143
7	195	17	127	10	195	61	56	84	98	98	152	143
8	66	17	127	10	195	61	56	84	98	98	152	143
9	10	46	127	10	127	61	56	84	98	98	152	143
10	10	98	126	10	84	61	56	84	98	98	152	143
11	10	98	124	11	112	61	56	84	98	98	152	143
12	49	98	124	15	152	61	56	84	98	98	152	143
13	135	98	124	18	195	30	56	79	98	98	152	143
14	135	220	124	30	152	13	56	74	98	98	152	143
15	135	143	124	55	112	13	56	31	98	98	152	143
16	135	143	124	168	152	13	56	10	98	98	152	143
17	135	143	124	342	195	30	56	10	98	98	152	143
18	135	143	220	500	195	61	56	10	98	98	152	143
19	135	143	220	342	195	61	56	10	98	98	152	143
20	135	135	49	451	213	61	56	10	98	98	152	143
21	135	135	10	368	289	61	56	10	98	98	143	143
22	49	135	10	409	388	30	70	10	98	98	143	143
23	10	135	10	538	409	13	84	74	98	98	143	143
24	12	133	10	626	409	13	84	74	98	127	143	143
25	13	130	10	582	328	13	84	74	98	152	143	143
26	17	130	10	538	251	13	84	85	98	152	143	143
27	17	130	10	494	91	13	84	98	98	152	143	143
28	17	130	10	472	13	13	84	98	98	152	143	143
29	17	130	10	451	160	13	84	98	98	152	143	143
30	17	......	10	409	430	13	84	98	98	152	143	143
31	17	......	10	......	430	......	84	98	......	152	......	143

NOTE.—Daily discharge determined from a rating curve fairly well defined below 250 second-feet. Discharge Apr. 17 to 19 estimated from two discharge measurements and flow over dam because of backwater at gage.

Monthly discharge of Middle Branch of Moose River at Old Forge, N. Y., for 1912.

[Drainage area, 51.5 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	204	10	95.1	1.85	2.13	A.
February	220	17	118	2.29	2.47	A.
March	220	10	88.6	1.72	1.98	A.
April	626	10	231	4.49	5.01	B.
May	430	13	210	4.08	4.70	B.
June	368	13	60.2	1.17	1.30	B.
July	84	28	63.7	1.24	1.43	A.
August	98	10	66.4	1.29	1.49	A.
September	98	98	98.0	1.90	2.12	A.
October	152	98	111	2.15	2.49	A.
November	152	143	149	2.90	3.24	A.
December	143	143	143	2.78	3.20	A.
The year	626	10	119	2.31	31.56	

STREAMS TRIBUTARY TO ST. LAWRENCE RIVER.

OSWEGATCHIE RIVER NEAR OGDENSBURG, N. Y.

Location.—At the steel highway bridge known locally as Eel Weir bridge, about 1 mile below the mouth of the outlet of Black Lake and 5½ miles above the city of Ogdensburg and the mouth of the river.

Records available.—April 22, 1903, to December 31, 1912. Data published also in annual reports of the State Water Supply Commission, State Conservation Commission, and State engineer and surveyor, State of New York.

Drainage area.—1,580 square miles.

Gage.—Chain, fastened to the upstream side of the bridge; read once daily; datum unchanged.

Channel.—Rocky and partly artificial, the rock having been removed underneath the bridge by blasting to increase the bridge opening.

Discharge measurements.—Usually made from the bridge. None made during 1912.

Artificial control.—Two dams in the vicinity of the gage: One at Heuvelton, about 5 miles above; one at Rensselaer Falls, 10 miles above.

Winter flow.—Not affected by ice, as the current at the station is swift.

Accuracy.—Rating curve fairly well developed; open-water curve used throughout the year.

Daily gage height, in feet, of Oswegatchie River near Ogdensburg, N. Y., for 1912.

[Joseph H. La Rue, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4	4.9	4.9	7.2	6.5	8.1	5.0	4.6	4.8	5.4	6.0	6.1
2	6.2	4.8	4.9	7.5	6.4	8.4	5.0	4.6	4.8	5.5	5.9	6.1
3	6.0	4.8	4.9	7.6	6.3	8.7	5.0	4.6	4.85	5.4	5.8	6.2
4	5.9	4.8	4.8	7.7	6.2	8.6	5.0	4.6	4.9	5.4	5.8	7.2
5	5.8	4.8	4.8	7.8	6.0	8.4	4.9	4.6	4.9	5.4	5.8	7.6
6	5.7	4.8	4.8	8.2	5.85	8.4	4.8	4.6	4.9	5.45	5.7	7.9
7	5.7	4.8	4.8	8.7	5.8	8.0	4.8	4.6	4.9	5.4	5.7	7.7
8	5.6	4.8	4.8	9.6	5.8	7.6	4.8	4.6	5.0	5.3	5.9	7.6
9	5.6	4.8	4.8	9.8	5.75	7.2	4.8	4.7	5.0	5.3	6.2	7.6
10	5.5	4.8	4.7	9.9	5.65	7.0	4.7	4.7	5.0	5.3	6.6	7.6
11	5.5	4.8	4.7	9.8	5.6	6.8	4.7	4.7	5.0	5.3	6.8	7.4
12	5.5	4.8	4.7	9.6	5.4	6.7	4.7	4.7	5.0	5.2	6.9	7.1
13	5.4	4.7	4.7	9.2	5.5	6.6	4.6	4.7	5.0	5.2	6.9	7.0
14	5.3	4.7	4.7	9.0	5.55	6.2	4.6	4.65	5.0	5.2	7.1	6.9
15	5.3	4.7	4.7	8.8	5.4	6.1	4.6	4.6	4.9	5.2	7.2	6.8
16	5.2	4.7	4.8	8.4	5.3	6.0	4.5	4.6	4.9	5.2	7.2	6.7
17	5.1	4.7	4.8	8.2	5.3	6.0	4.5	4.6	4.9	5.2	7.3	6.6
18	5.0	4.7	4.9	8.2	5.55	5.9	4.5	4.6	4.9	5.2	7.3	6.5
19	5.0	4.7	4.9	8.2	5.75	5.85	4.6	4.6	4.9	5.2	7.2	6.5
20	5.0	4.7	5.2	8.1	5.95	5.65	4.5	4.6	4.9	5.2	7.1	6.5
21	5.0	4.7	5.9	8.0	6.4	5.5	4.6	4.6	5.05	5.2	6.8	6.5
22	4.9	4.7	6.4	8.0	6.4	5.5	4.5	4.6	5.2	5.2	6.7	6.6
23	4.9	4.7	6.3	7.8	6.8	5.4	4.5	4.6	5.3	5.2	6.6	6.4
24	4.9	4.8	6.3	7.6	6.9	5.3	4.5	4.6	5.3	5.2	6.6	6.3
25	4.9	4.8	6.2	7.6	7.0	5.2	4.5	4.6	5.4	5.3	6.6	6.2
26	4.9	4.9	6.2	7.5	7.2	5.2	4.5	4.6	5.4	5.5	6.4	6.2
27	4.9	4.9	6.2	7.4	7.1	5.1	4.55	4.6	5.4	5.8	6.4	6.2
28	4.9	4.9	6.2	7.2	7.0	5.05	4.6	4.6	5.45	5.85	6.2	6.1
29	4.9	4.9	6.2	7.0	7.0	5.0	4.6	4.6	5.4	5.95	6.2	6.1
30	4.9	....	6.4	6.7	7.0	5.0	4.6	4.65	5.4	6.2	6.1	6.1
31	4.9	....	6.7	....	7.6	....	4.6	4.7	....	6.0	....	6.2

NOTE.—Relation of gage height to discharge at this station not materially affected by ice.

Daily discharge, in second-feet, of Oswegatchie River near Ogdensburg, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,600	1,030	1,030	6,960	4,890	9,660	1,200	580	870	1,970	3,440	3,730
2	4,020	870	1,030	7,850	4,600	10,600	1,200	580	870	2,180	3,160	3,730
3	3,440	870	1,030	8,150	4,310	11,500	1,200	580	950	1,970	2,890	4,020
4	3,160	870	870	8,450	4,020	11,200	1,200	580	1,030	1,970	2,890	6,960
5	2,890	870	870	8,750	3,440	10,600	1,030	580	1,030	1,970	2,890	8,150
6	2,640	870	870	9,960	3,020	10,600	870	580	1,030	2,080	2,640	9,050
7	2,640	870	870	11,500	2,890	9,350	870	580	1,080	1,970	2,640	8,450
8	2,400	870	870	14,300	2,890	8,150	870	580	1,200	1,770	3,160	8,150
9	2,400	870	870	14,900	2,760	6,960	870	720	1,200	1,770	4,020	8,150
0	2,180	870	720	15,200	2,520	6,360	720	720	1,200	1,770	5,180	8,150
1	2,180	870	720	14,900	2,400	5,780	720	720	1,200	1,770	5,780	7,550
2	2,180	870	720	14,300	1,970	5,480	720	720	1,200	1,570	6,070	6,660
3	1,970	720	720	13,000	2,180	5,180	580	720	1,200	1,570	6,070	6,360
4	1,770	720	720	12,400	2,290	4,020	580	650	1,200	1,570	6,660	6,070
5	1,770	720	720	11,800	1,970	3,730	580	580	1,030	1,570	6,960	5,780
6	1,570	720	870	10,600	1,770	3,440	450	580	1,030	1,570	6,960	5,480
17	1,380	720	870	9,960	1,770	3,440	450	580	1,030	1,570	7,250	5,180
8	1,200	720	1,030	9,960	2,290	3,160	450	580	1,030	1,570	7,250	4,890
19	1,200	720	1,030	9,960	2,760	3,020	580	580	1,030	1,570	6,960	4,890
20	1,200	720	1,570	9,660	3,300	2,520	450	580	1,030	1,570	6,660	4,890
21	1,200	720	3,160	9,350	4,600	2,180	580	580	1,290	1,570	5,780	4,890
22	1,030	720	4,600	9,350	4,600	2,180	450	580	1,570	1,570	5,480	5,180
23	1,030	720	4,310	8,750	5,780	1,970	450	580	1,770	1,570	5,180	4,600
24	1,030	870	4,310	8,150	6,070	1,770	450	580	1,770	1,570	5,180	4,310
25	1,030	870	4,020	8,150	6,360	1,570	450	580	1,970	1,770	5,180	4,020
26	1,030	1,030	4,020	7,850	6,960	1,570	450	580	1,970	2,180	4,600	4,020
27	1,030	1,030	4,020	7,550	6,660	1,380	515	580	1,970	2,890	4,600	4,020
28	1,030	1,030	4,020	6,960	6,360	1,290	580	580	2,080	3,020	4,020	3,730
29	1,030	1,030	4,020	6,360	6,360	1,200	580	580	1,970	3,300	4,020	3,730
30	1,030	....	4,600	5,480	6,360	1,200	580	650	1,970	4,020	3,730	3,730
31	1,030	....	5,480	....	8,150	....	580	720	....	3,440	....	4,020

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Oswegatchie River near Ogdensburg, N. Y., for 1912.

[Drainage area, 1,580 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	4,600	1,030	1,880	1.19	1.37	B.
February	1,030	720	841	.532	.57	C.
March	5,480	720	2,080	1.32	1.52	B.
April	15,200	5,480	10,000	6.33	7.06	A.
May	8,150	1,770	4,070	2.58	2.97	A.
June	11,500	1,200	5,040	3.19	3.56	A.
July	1,200	450	686	.434	.50	C.
August	720	580	612	.387	.45	C.
September	2,080	870	1,320	.835	.93	C.
October	4,020	1,570	2,010	1.27	1.46	B.
November	7,250	2,640	4,910	3.11	3.47	A.
December	9,050	3,730	5,570	3.53	4.07	A.
The year	15,200	450	3,240	2.05	27.93	

EAST BRANCH OF OSWEGATCHIE RIVER AT NEWTON FALLS, N. Y.

Location.—Six hundred feet below the lower dam of the Newton Falls Paper Co., in the village of Newton Falls; 4 miles above the mouth of Little River (coming in from the left) and 10 miles below the outlet of Cranberry Lake.

Records available.—October 6 to December 31, 1912.

Drainage area.—166 square miles, of which 12.8 square miles is water surface in Cranberry Lake.

Gage.—A staff set vertically in a concrete pier; read twice daily.

Channel.—One channel at all stages; bed consists of small bowlders and gravel, covered with waste from the pulp mill above.

Discharge measurements.—At low stages made by wading 100 yards above the gage; at high stages, from a cable and car 30 feet above the gage.

Winter flow.—No information; effect of ice is probably diminished by the operation of the paper mill.

Artificial control.—The dams of the paper mill cause some daily fluctuation—probably not enough to affect the accuracy of the records. Seasonal flow is largely controlled by a dam at Cranberry Lake and the range of gage heights will probably not be more than 5 feet.

Accuracy.—A well-defined discharge curve has been developed for ordinary stages. No high-water measurements have yet been made. Estimates good.

Cooperation.—Gage heights furnished by the Newton Falls Paper Co.

Discharge measurements of East Branch of Oswegatchie River at Newton Falls, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 6[a]	C. S. De Golyer	0.30	41.4
9	.....do	1.95	276
Dec. 16	Frank Weber	2.95	558
16	R. S. Barnes	2.57	454

[a] Made by wading 400 feet above gage.

Daily gage height, in feet, of East Branch of Oswegatchie River at Newton Falls, N. Y., for 1912.

[Chas. H. Corp, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		1.8	0.58	11	2.0	2.6	2.6	21	2.25	2.1	2.4
2		2.1	2.25	12	1.8	2.45	2.6	22	2.2	2.3	1.7
3		.60	2.8	13	.40	2.5	2.6	23	2.1	2.4	2.7
4		2.35	2.8	14	2.25	2.6	2.5	24	1.85	.52	2.4
5		2.2	2.6	15	2.1	2.5	1.5	25	1.65	2.4	2.4
6	0.30	2.0	2.8	16	1.9	2.35	2.7	26	1.7	2.4	2.4
7	2.1	2.0	2.6	17	1.7	1.6	2.4	27	.55	2.15	2.3
8	2.2	1.9	2.0	18	1.65	2.6	2.4	28	2.3	2.1	2.25
9	1.8	2.1	2.6	19	1.65	2.4	2.6	29	2.1	2.1	1.4
10	1.75	2.35	2.6	20	.52	2.2	2.5	30	2.05	2.1	2.7
								31	1.8		2.4

NOTE.—Mean daily gage height obtained by weighting individual observations according to the number of hours for which each one applies, as determined from observer's notes concerning operation of mill and sluice gates.

Daily discharge, in second-feet, of East Branch of Oswegatchie River at Newton Falls, N. Y., for 1912.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	......	244	63	11	290	452	452	21	353	314	394
2	......	314	353	12	244	408	452	22	340	366	222
3	......	65	512	13	49	422	452	23	314	394	482
4	......	380	512	14	353	452	422	24	255	59	394
5	......	340	452	15	314	422	183	25	212	394	394
6	42	290	512	16	266	380	482	26	222	394	394
7	314	290	452	17	222	202	394	27	61	327	366
8	340	266	290	18	212	452	394	28	366	314	353
9	244	314	452	19	212	394	452	29	314	314	165
10	233	380	452	20	59	340	422	30	302	314	482
								31	244	......	394

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of East Branch of Oswegatchie River at Newton Falls, N. Y., for 1912.

[Drainage area, 166 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
October 6-31	366	42	245	1.48	1.43	A.
November	452	59	333	2.01	2.24	A.
December	512	63	393	2.37	2.37	A.

RAQUETTE RIVER AT RAQUETTE FALLS, NEAR COREYS, N. Y.

Location.—Six miles above Axton, which is 2½ miles south of Coreys, 5 miles below the outlet of Long Lake and 2 miles below the mouth of Moose Creek.

Records available.—August 27, 1908, to November 10, 1912. Published also in annual reports of New York State Water-Supply Commission and New York State engineer and surveyor.

Drainage area.—418 square miles.

Gage.—A staff fastened to the right bank in a comparatively smooth section between two small falls; read once during the open-water period and weekly during the ice period; datum unchanged since station was established.

Channel.—Rough, composed of large bowlders; permanent; one channel at all stages.

Discharge measurements.—Made from a car and cable about 10 feet above the gage.

Winter flow.—Relation of gage height to discharge somewhat affected by ice.

Accuracy.—Open-water discharge curve well defined: log jams liable to occur.

Discharge measurements of Raquette River at Raquette Falls, near Coreys, N. Y., in 1912.

Date.		Hydrographer.	Gage height.	Discharge.
			Feet.	*Sec.-ft.*
Feb.	19[a]	Frank Weber	2.04	251
Apr.	16	.....do	5.25	2,560
	17	.....do	5.75	3,400
	25	.....do	6.55	4,260
May	18[b]	.....do	4.87	1,850
	19[b]	.....do	4.68	1,680
July	18	G. H. Canfield	1.42	124
	18	.....do	1.42	130
	18[c]	.....do	1.41	125
Sept.	12	Frank Weber	2.11	280
	12	.....do	2.11	286

[a] Measurements made under complete ice cover.
[b] Log jam below gage.
[c] Wading 2 miles below gage.

Daily gage height, in feet, of Raquette River at Raquette Falls, near Coreys, N. Y., for 1912.

[C. A. De Lancett, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	3.7		2.2	2.4	5.7	5.1	1.8	1.4	1.6	2.7	3.4
2	3.6			2.5	5.6	5.1	1.8	1.38	2.0	2.8	3.4
3	3.5			2.5	5.4	4.9	1.7	1.5	2.1	2.75	3.4
4	3.5			2.7	5.2	4.7	1.7	1.7	2.3	2.7	3.4
5	3.4	2.4		2.8	5.0	4.6	1.8	1.7	2.2	2.65	3.5
6	3.2			3.0	4.9	4.5	1.9	1.6	2.5	2.6	3.5
7				3.5	4.9	4.4	1.8	1.6	2.5	2.6	3.5
8	3.1		1.4	3.9	4.9	4.2	1.7	1.55	2.35	2.55	4.1
9				4.4	4.9	4.1	1.6	1.6	2.2	2.5	4.0
10				4.6	4.9	4.0	1.5	1.6	2.1	2.45	3.9
11				4.6	5.0	3.9	1.6	1.6	2.1	2.4	
12				4.5	5.0	3.8	1.5	2.1	2.0	2.45	
13				4.5	5.1	3.7	1.40	2.0	2.0	2.45	
14				4.5	4.9	3.6	1.6	1.9	1.9	2.4	
15	2.9		1.8	4.6	4.8	3.5	1.5	1.8	1.9	2.4	
16				5.1	4.6	3.4	1.7	1.7	2.5	2.4	
17				5.8	4.6	3.3	1.55	1.6	2.4	2.45	
18		2.2		6.0	4.7	3.1	1.42	1.6	2.4	2.5	
19		2.04		6.3	4.7	3.0	1.42	1.6	2.4	2.9	
20				6.3	4.7	2.9	1.38	1.55	2.4	2.8	
21				6.2	5.2	2.8	1.38	1.5	2.45	2.8	
22	3.6		2.3	6.1	5.7	2.7	2.0	1.5	2.5	2.85	
23		1.8		6.3	5.7	2.6	1.85	1.5	2.55	2.9	
24				6.7	5.6	2.5	1.7	1.6	2.6	2.9	
25				6.7	5.6	2.4	1.6	1.7	2.6	3.2	
26				6.5	5.3	2.3	1.55	1.8	2.6	3.2	
27				6.5	5.3	2.2	1.5	2.15	2.6	3.3	
28	3.3			6.0	5.1	2.1	1.42	2.1	2.65	3.3	
29			2.4	6.0	4.9	2.0	1.50	2.0	2.6	3.3	
30				5.8	5.2	1.9	1.45	1.9	2.6	3.35	
31					5.1		1.41	1.7		3.35	

NOTE.—Relation of gage height to discharge affected by ice Jan. 7 to Mar. 18, but as the velocity at this station is relatively high the effect of ice is not great. A log jam caused backwater at the gage May 6 to May 25.

Daily discharge, in second-feet, of Raquette River at Raquette Falls, near Coreys, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1,200	530	295	372	3,240	2,440	202	123	159	484	854
2	1,120	490	270	407	3,100	2,440	202	120	252	528	854
3	1,040	450	245	407	2,820	2,200	180	140	280	506	854
4	1,040	400	220	484	2,560	1,960	180	180	339	484	854
5	970	355	195	528	2,320	1,850	202	180	309	464	920
6	830	350	170	626	1,880	1,750	226	159	407	444	920
7	800	345	145	920	1,880	1,650	202	159	407	444	920
8	770	340	115	1,220	1,880	1,470	180	150	356	426	1,380
9	740	335	125	1,650	1,880	1,380	159	159	309	407	1,300
0	700	330	140	1,850	1,880	1,300	140	159	280	390	1,220
1	670	325	150	1,850	2,000	1,220	159	159	280	372	....
2	630	320	160	1,750	2,000	1,140	140	280	252	390	....
3	600	315	170	1,750	2,100	1,060	123	252	252	390	....
4	560	310	180	1,750	1,880	990	159	226	226	372	....
5	530	305	190	1,850	1,780	920	140	202	226	372	....
6	570	300	210	2,440	1,600	854	180	180	407	372	....
7	610	295	230	3,380	1,600	792	150	159	372	390	....
8	650	295	250	3,660	1,690	678	126	159	372	407	....
9	690	251	270	4,100	1,690	626	126	159	372	576	....
0	740	235	290	4,100	1,690	576	120	150	372	528	....
21	780	220	315	3,940	2,200	528	120	140	390	528	....
22	820	205	339	3,800	2,800	484	252	140	407	552	....
23	800	190	343	4,100	2,800	444	214	140	426	576	....
24	780	205	348	4,740	2,670	407	180	159	444	576	....
25	760	220	352	4,740	2,670	372	159	180	444	734	....
26	740	235	357	4,420	2,680	339	150	202	444	734	....
27	720	250	362	4,420	2,680	309	140	294	444	792	....
28	690	265	367	3,660	2,440	280	126	280	464	792	....
29	650	280	372	3,660	2,200	252	140	252	444	792	....
30	610	....	372	3,380	2,560	226	132	226	444	823	....
31	570	....	372	....	2,440	....	125	180	....	823	....

NOTE.—Daily discharge determined as follows: Jan. 1 to 6, from a well-defined rating curve; Mar. 19 to May 5 and May 26 to Dec. 31, from a fairly well-defined curve; May 6 to 25, from a rating curve based on two measurements made while the log jam existed; for the period during which ice was present, Jan. 7 to Mar. 18, estimated by means of a rating curve based on one measurement made with ice present, and the shape of the open-water rating curves. Discharge interpolated for days on which gage was not read.

Monthly discharge of Raquette River at Raquette Falls, near Coreys, N. Y., for 1912.

[Drainage area, 418 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,200	530	754	1.80	2.08	C.
February	530	190	308	.737	.79	C.
March	372	115	255	.610	.70	C.
April	4,740	372	2,530	6.05	6.75	B.
May	3,240	1,600	2,250	5.38	6.20	B.
June	2,440	226	1,030	2.46	2.74	A.
July	252	120	162	.388	.45	A.
August	294	120	182	.435	.50	A.
September	464	159	353	.844	.94	A.
October	823	372	531	1.27	1.46	A.
November 1-10	1,380	854	1,010	2.42	.90	A.

RAQUETTE RIVER AT PIERCEFIELD, N. Y.

Location.—About three-fourths mile above the head of Black Rapids and half a mile below the dam of the International Paper Co. at Piercefield.

Records available.—August 20, 1908, to December 31, 1912. Data also in annual reports of the State Water-Supply Commission and the State engineer and surveyor, State of New York.

Drainage area.—723 square miles.

Gage.—A chain gage fastened to a large stump installed September 4, 1910, to replace the vertical staff which was fastened to the same stump and was used from August 20, 1908, to September 3, 1910. The datum of the chain gage was the same as that of the original staff gage; from January 1, 1911, to December 31, 1912, the datum of the chain gage was 2 feet lower. During 1912, a Stevens automatic gage was installed in a galvanized sheet-iron house (4 by 6 feet inside dimensions). The instrument is set over a concrete well 3½ feet square (inside dimensions) and 15 feet deep. The well is connected with the river by a 4-inch cast-iron water pipe 60 feet long. A shear gate valve is set at the inner end of the pipe for use in cleaning the well. The outer end of the pipe terminates in a concrete box 1 foot square (inside dimensions) connected with the river by three small intake pipes, 2 inches in diameter, their outer ends protected with a screen. The river at this point contains a considerable amount of wood pulp, and this special construction was deemed necessary to keep the pulp out of the intake pipe. The station is shown in Plate III, *B* (p. 96).

Channel.—The channel opposite the gage is a deep pond in which velocity is not perceptible. The control of this pond is at the head of Black Rapids and is permanent.

Discharge measurements.—Made from a cable (span 171 feet) at the section formerly used for boat measurements just above Black Rapids.

Winter flow.—The rapids controlling the stream at the gage rarely freeze and measurements made with ice present indicate that the relation between gage height and discharge is little if at all affected by ice. Open-water discharge rating curve is usually applicable throughout the year.

Artificial control.—The dam of the International Paper Co. controls the flow of the stream at the station during low-water periods, but the mill is usually run for 24 hours each day, except Sundays. The numerous lakes in the upper part of the drainage basin afford considerable storage, most of which is controlled.

Accuracy.—Although the discharge at this station is somewhat affected by artificial control, the records are believed to be good; with automatic gage, they should be excellent.

Cooperation.—The recording gage is attended by an employee of the International Paper Co.

Discharge measurements of Raquette River at Piercefield, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 31[a]	Frank Weber	5.38	1,0[illegible]
Feb. 20[a]	.....do	4.00	454
July 16	G. H. Canfield	3.80	434
Oct. 25	Frank Weber	5.50	1,110

[a] Made under complete ice cover 1½ miles below gage.

Daily gage height, in feet, of Raquette River at Piercefield, N. Y., for 1912.

[W. B. Graves, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.1	4.5	4.4	4.2	10.6	7.2	4.4	3.8	2.1	3.35	5.8	6.2
2	6.9	4.6	4.3	4.3	10.5	7.0	4.2	3.5	1.4	3.6	5.8	6.3
3	6.9	4.5	1.7	4.3	10.3	7.2	4.2	2.0	3.3	4.6	4.4	6.2
4	7.1	2.25	1.85	4.3	10.4	7.2	4.2	1.55	3.9	5.1	6.0	6.2
5	6.8	4.6	4.1	4.4	9.2	7.2	4.2	3.25	4.0	5.3	5.9	6.3
6	6.6	4.6	4.2	4.3	9.1	7.2	4.3	3.8	4.0	3.1	6.0	6.3
7	6.6	4.4	4.3	3.8	9.1	7.2	2.6	3.8	4.1	4.1	6.0	6.2
8	6.4	4.4	4.3	4.2	8.8	7.1	4.2	3.8	2.7	5.7	6.0	6.0
9	5.8	4.5	4.3	4.6	8.8	6.8	3.6	3.6	3.8	5.4	6.0	6.1
0	5.2	4.4	1.6	4.6	8.8	7.2	3.4	2.75	4.3	5.2	5.5	6.2
1	5.5	2.25	1.9	4.6	8.6	6.8	4.2	1.55	4.2	5.4	6.4	6.4
2	5.8	4.6	4.0	4.9	7.8	6.8	3.1	3.5	4.1	5.2	7.2	6.2
3	5.8	4.7	4.2	4.8	7.9	6.6	2.9	3.8	4.1	3.3	7.3	6.2
4	5.8	4.6	4.3	4.8	7.8	6.6	1.88	3.8	4.2	5.6	7.2	6.1
5	5.8	4.6	4.3	5.6	7.7	6.6	2.55	3.8	2.8	5.2	7.2	5.8
6	5.8	4.5	4.3	6.0	7.6	6.2	3.7	3.4	3.8	5.4	7.2	6.2
7	5.8	4.5	1.65	6.8	7.6	6.5	3.6	2.8	4.0	5.3	6.6	6.3
8	5.4	2.0	1.75	6.8	7.4	6.3	3.6	1.65	4.1	5.6	7.4	6.3
9	4.4	4.4	4.2	7.2	7.5	6.4	1.75	3.5	4.1	5.2	7.6	6.2
0	3.8	4.5	4.2	7.5	7.4	6.2	1.5	3.8	4.2	2.9	7.8	6.3
1	3.8	4.5	4.1	7.2	7.2	6.0	1.4	3.8	4.0	5.4	7.6	6.2
2	3.8	4.5	4.1	8.1	7.3	6.0	3.45	3.8	3.4	5.4	7.4	4.7
3	3.8	4.5	4.1	8.6	7.2	4.6	3.8	3.7	3.8	5.6	7.4	4.8
4	5.0	4.5	1.7	9.0	7.2	5.5	3.8	2.75	4.1	5.3	6.2	4.8
5	5.2	1.9	2.05	9.6	7.1	6.2	3.8	1.55	4.2	5.0	6.5	4.8
6	5.2	2.05	4.1	9.7	6.4	5.8	1.85	3.3	4.2	5.2	6.6	5.5
7	5.2	4.4	4.1	10.5	6.8	5.8	1.8	3.9	4.1	3.1	6.5	5.8
8	2.75	4.4	4.1	9.8	7.2	5.5	1.55	3.8	4.2	5.6	6.6	5.8
9	5.2	4.4	4.2	10.7	7.5	5.5	3.6	3.7	2.85	5.4	6.5	5.0
0	5.3	......	4.3	11.4	7.4	2.45	3.8	3.8	4.0	5.5	6.4	5.4
1	5.4	......	4.0	......	7.3	......	3.8	3.8	......	5.4	......	5.8

NOTE.—Relation of gage height to discharge at this station not affected by ice.

Daily gage height, in feet, of Raquette River at Piercefield, N. Y., for 1912.

[Automatic gage.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	......	5.67	6.16	11	......	6.96	6.47	21	......	7.13	6.10
2	......	5.82	6.32	12	......	7.01	6.44	22	5.08	6.65	5.55
3	......	4.73	6.36	13	......	7.03	6.42	23	5.35	6.88	5.68
4	......	5.87	6.40	14	......	7.09	6.15	24	5.15	6.44	5.77
5	......	5.96	6.45	15	......	7.19	6.16	25	5.04	6.85	5.46
6	......	5.89	6.46	16	......	7.18	6.30	26	5.37	6.67	5.95
7	......	5.92	6.78	17	......	6.99	6.21	27	3.66	6.60	6.00
8	......	5.91	6.23	18	......	7.33	6.20	28	4.72	6.54	5.99
9	......	6.23	6.60	19	......	7.25	6.15	29	5.46	6.43	5.07
0	......	6.40	6.49	20	......	7.12	6.14	30	5.48	6.32	5.88
								31	5.56	......	5.94

NOTE.—Mean daily gage height obtained by averaging hourly readings for each 24-hour period.

Daily discharge, in second-feet, of Raquette River at Piercefield, N Y., for 1912.

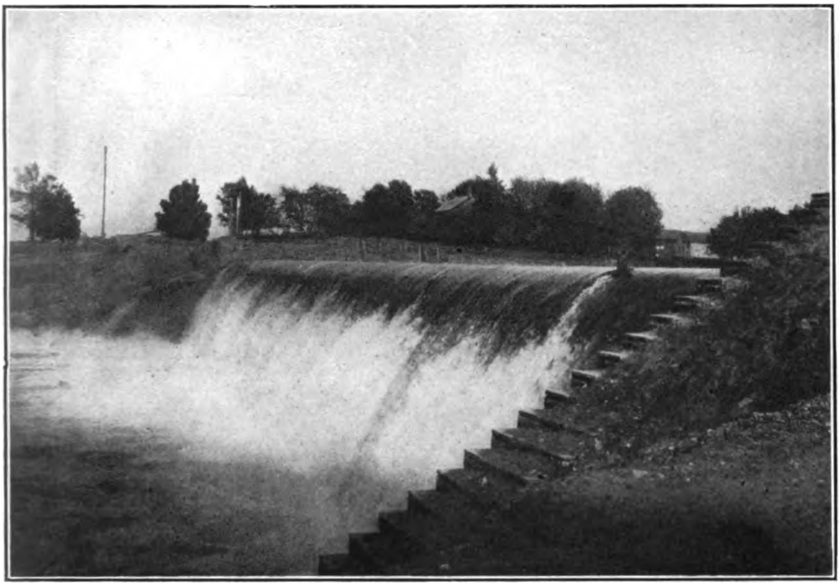
Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,290	650	615	545	6,100	2,380	615	425	96	303	1,280	1,560
2	2,110	690	580	580	5,980	2,200	545	342	44	369	1,280	1,630
3	2,110	650	64	580	5,740	2,380	545	88	290	690	615	1,560
4	2,290	110	76	580	5,860	2,380	545	54	455	895	1,420	1,560
5	2,020	690	515	615	4,430	2,380	545	278	485	990	1,350	1,630
6	1,860	690	545	580	4,320	2,380	580	425	485	244	1,420	1,630
7	1,860	615	580	425	4,320	2,380	147	425	515	515	1,420	1,560
8	1,700	615	580	545	3,980	2,290	545	425	161	1,220	1,420	1,420
9	1,280	650	580	690	3,980	2,020	369	369	425	1,040	1,420	1,490
10	940	615	57	690	3,980	2,380	316	169	580	940	1,100	1,560
11	1,100	110	80	690	3,760	2,020	545	54	545	1,040	1,700	1,700
12	1,280	690	485	810	2,950	2,020	244	342	515	940	2,380	1,560
13	1,280	730	545	770	3,050	1,860	196	425	515	290	2,470	1,560
14	1,280	690	580	770	2,950	1,860	78	425	545	1,100	2,380	1,490
15	1,280	690	580	1,160	2,850	1,860	141	425	177	940	2,380	1,280
16	1,280	650	580	1,420	2,750	1,560	397	316	425	1,040	2,380	1,560
17	1,280	650	60	2,020	2,750	1,780	369	177	485	990	1,860	1,630
18	1,040	88	68	2,020	2,560	1,630	369	60	515	1,160	2,560	1,630
19	615	615	545	2,380	2,650	1,700	68	342	515	940	2,750	1,560
20	425	650	545	2,650	2,560	1,560	50	425	545	196	2,950	1,630
21	425	650	515	2,380	2,380	1,420	44	425	485	1,040	2,750	1,560
22	425	650	515	3,250	2,470	1,420	329	425	316	1,040	2,560	730
23	425	650	515	3,760	2,380	690	425	397	425	1,160	2,560	770
24	850	650	64	4,200	2,380	1,100	425	169	515	990	1,560	770
25	940	80	92	4,900	2,290	1,560	425	54	545	850	1,780	770
26	940	92	515	5,020	1,700	1,280	76	290	545	940	1,860	1,100
27	940	615	515	5,980	2,020	1,280	72	455	515	244	1,780	1,280
28	169	615	515	5,140	2,380	1,100	54	425	545	1,160	1,860	1,280
29	940	615	545	6,220	2,650	1,100	369	397	186	1,040	1,780	850
30	990	......	580	7,060	2,560	130	425	425	485	1,100	1,700	1,040
31	1,040	......	485	......	2,470	......	425	425	......	1,040	......	1,280

Daily discharge, in second-feet, of Raquette River at Piercefield, N. Y., for 1912.

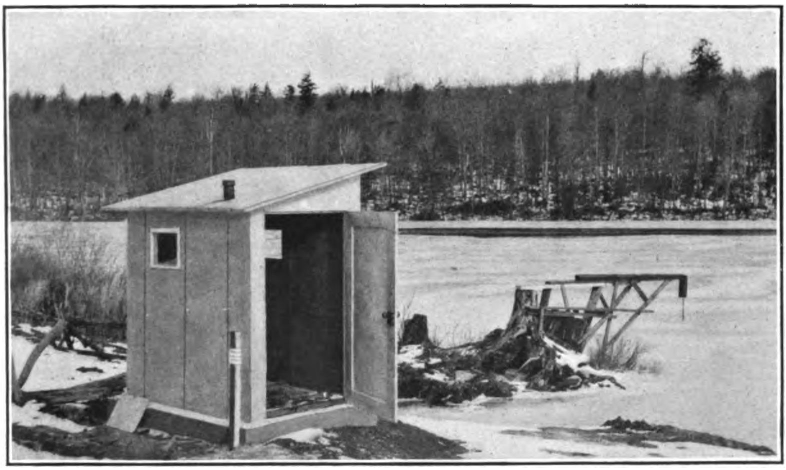
[Automatic gage.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	......	1,200	1,530	11	......	2,160	1,760	21	......	2,320	1,490
2	......	1,290	1,640	12	......	2,210	1,730	22	886	1,900	1,130
3	......	740	1,670	13	......	2,230	1,720	23	1,020	2,090	1,210
4	......	1,330	1,700	14	......	2,280	1,520	24	918	1,730	1,260
5	......	1,390	1,740	15	......	2,370	1,530	25	868	2,060	1,080
6	......	1,340	1,750	16	......	2,360	1,630	26	1,020	1,920	1,380
7	......	1,360	2,000	17	......	2,190	1,570	27	386	1,860	1,420
8	......	1,360	1,580	18	......	2,500	1,560	28	738	1,810	1,410
9	......	1,580	1,860	19	......	2,420	1,520	29	1,080	1,720	882
10	......	1,700	1,770	20	......	2,310	1,520	30	1,090	1,640	1,340
								31	1,140	......	1,380

NOTE.—Daily discharge determined from a well-defined rating curve.



A. DAM ON RAQUETTE RIVER AT HANNAWA FALLS, N. Y.



B. GAGING STATION ON RAQUETTE RIVER AT PIERCEFIELD, N. Y.

Monthly discharge of Raquette River at Piercefield, N. Y., for 1912.

[Drainage area, 723 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,290	169	1,210	1.67	1.92	A.
February	730	80	557	.769	.83	B.
March	615	57	423	.585	.67	B.
April	7,060	425	2,280	3.15	3.51	A.
May	6,100	1,700	3,330	4.61	5.32	A.
June	2,380	130	1,740	2.41	2.69	A.
July	615	44	332	.459	.53	A.
August	455	54	319	.441	.51	A.
September	580	44	429	.593	.66	B.
October	1,220	244	853	1.18	1.36	A.
November	2,950	615	1,890	2.61	2.91	A.
December	1,700	730	1,380	1.91	2.20	A.
The year	7,060	44	1,220	1.69	23.11	B.
Automatic gage.						
October 22-31	1,140	386	915	1.27	0.47	A.
November	2,700	740	1,850	2.56	2.86	A.
December	2,150	882	1,520	2.10	2.42	A.

RAQUETTE RIVER AT MASSENA SPRINGS, N. Y.

Location.—At highway bridge at Massena Springs, N. Y., 1,000 feet above the New York Central & Hudson River Railroad Bridge, used for freight transfer from the railroad station to the Massena power plant, 8 miles below Raymondville and 10 miles above the mouth of the stream.

Records available.—September 21, 1903, to October 17, 1903; April 9, 1904, to December 31, 1912. Data also in annual reports of the United States Geological Survey, State Water Supply Commission, and the State engineer and surveyor, State of New York.

Drainage area.—1,170 square miles.

Gage.—Chain, attached to upstream side of concrete bridge on February 2, 1912. Original gage was a vertical staff fastened to a stone wall on the left bank about 50 feet upstream from the present bridge. This was replaced August 16, 1906, by a standard chain gage fastened to the old highway bridge just above the present bridge. The datum of the chain gage was set 1.00 lower than that of the staff gage to prevent negative gage heights. The chain gage was set on the concrete bridge at such a datum that readings should be comparable with those at the former site.

Channel.—Bed of river of coarse gravel and small bowlders; permanent; current good at all points.

Discharge measurements.—Made from new bridge.

Artificial control.—The operation of a number of power plants above the station has marked effect on the low water discharge of the stream. These plants are usually run for 24-hour power, but are closed on Sundays. The effect of the Sunday closing is shown in the stream for several days.

Winter flow.—Ice forms at this station to a thickness of 3 feet and considerably affects the relation of gage height to discharge for December, January, February, and March.

Accuracy.—Conditions are fair at the new bridge, but the rating curve is somewhat changed. Determinations of monthly discharge are considered good, but those of daily discharge may be somewhat in error for low-water periods, due to artificial control. Monthly estimates for periods during which ice is present also subject to errors.

Discharge measurements of Raquette River at Massena Springs, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 1[a]	G. H. Canfield	[b] 4.28	696	Apr. 20	Frank Weber	9.01	8,270
2[a]	Frank Weber	4.72	916	May 15	.....do	[c] 5.68	4,050
24[a]	.....do	4.81	896	July 26	G. H. Canfield	1.58	395
Mar. 14[a]	C. S. De Golyer	3.64	498	27[d]	.....do	1.63	378
Apr. 12	Frank Weber	6.66	4,810	Oct. 21	J. G. Mathers	2.79	1,053
13	.....do	6.64	4,610	24	.....do	2.02	620
19	.....do	9.29	8,610	25	.....do	3.41	1,530

[a] Measurement made under complete ice cover.
[b] Gage in old position on steel highway bridge.
[c] Gage in new position on concrete highway bridge.
[d] Made by wading near site of old bridge.

Daily gage height, in feet, of Raquette River at Massena Springs, N. Y., for 1912.

[F. L. Babcock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.4	4.9	4.2	7.6	8.2	9.0	1.9	1.65	1.7	3.2	3.0	4.2
2	......	4.7	4.0	7.4	8.0	8.0	2.25	1.65	1.6	3.1	3.0	4.0
3	......	......	4.0	7.0	7.6	7.4	2.25	1.75	1.8	3.0	3.2	4.0
4	8.4	......	4.4	5.8	7.4	6.8	1.95	1.55	1.85	3.0	3.2	4.4
5	......	......	4.4	7.4	7.0	6.7	1.3	1.75	2.0	2.8	3.3	5.5
6	......	4.4	4.4	12.8	7.0	6.7	1.8	2.1	2.35	3.0	3.4	6.1
7	......	......	4.4	13.6	6.8	6.4	2.0	2.1	2.6	3.0	4.2	6.0
8	......	......	4.4	12.4	6.7	6.1	2.5	2.05	2.6	3.1	5.9	5.8
9	......	......	4.4	10.0	6.6	5.8	2.1	1.95	2.6	3.0	5.8	5.8
10	......	......	4.2	9.0	6.5	5.8	1.65	2.1	2.6	2.6	5.6	5.6
11	6.8	......	4.0	8.6	6.2	5.8	1.45	1.85	2.05	3.1	5.0	5.6
12	......	4.6	4.0	6.9	6.0	5.2	1.75	2.05	1.75	3.2	5.0	5.4
13	......	......	4.4	6.6	6.0	5.2	1.65	2.35	2.0	3.1	5.4	5.2
14	......	......	3.6	6.6	5.8	5.0	1.6	2.1	2.8	3.0	5.8	5.2
15	......	......	4.0	6.8	5.6	4.6	1.85	1.95	2.6	3.0	5.8	5.3
16	......	......	4.4	7.3	5.6	4.6	1.85	1.3	2.6	2.9	5.7	5.5
17	......	4.4	5.0	8.1	5.8	4.8	1.75	1.75	2.5	2.45	5.6	6.2
18	......	......	4.6	9.1	6.0	4.0	1.6	1.6	2.4	2.3	5.4	7.0
19	6.5	4.4	5.4	9.4	6.0	4.2	1.5	1.85	2.4	2.8	4.8	6.9
20	......	3.8	6.0	9.0	5.8	4.0	1.45	2.0	2.6	2.9	5.0	6.8
21	......	3.8	6.0	8.8	6.0	3.7	1.35	1.8	2.6	2.8	4.9	6.6
22	......	3.8	5.8	8.8	6.4	3.6	1.25	1.85	2.8	2.8	4.8	6.6
23	......	3.7	5.4	8.9	6.6	3.4	2.4	1.85	2.8	2.8	4.7	6.6
24	......	5.0	5.4	9.4	6.5	3.2	1.8	1.95	2.9	2.6	4.6	6.5
25	4.9	4.8	5.2	9.4	6.7	3.0	1.75	2.9	3.0	3.4	4.8	6.4
26	......	4.6	4.8	9.3	6.6	2.8	1.6	2.45	3.0	3.8	4.9	6.5
27	......	4.5	4.8	9.1	6.5	2.8	1.55	2.15	3.0	3.4	4.8	6.4
28	......	4.2	4.8	8.9	6.6	2.9	2.6	1.9	3.1	3.4	4.7	6.3
29	......	4.2	6.0	8.6	6.9	2.8	1.7	1.45	3.2	3.3	4.6	6.4
30	......	......	7.0	8.4	8.0	2.6	1.7	.7	3.2	3.2	4.4	6.4
31	......	......	7.0	......	10.2	......	1.9	1.45	......	3.0	......	6.2

NOTE.—The gage was removed from old highway bridge Feb. 2. See gage in station description. Relation of gage height to discharge affected by ice Jan. 1 to Apr. 8.

Daily discharge, in second-feet, of Raquette River at Massena Springs, N. Y., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	955	675	2,000	6,870	8,050	515	398	420	1,360	1,200	2,220
2	......	865	605	2,000	6,590	6,590	705	398	375	1,280	1,200	2,040
3	......	835	605	2.000	6.040	5,780	705	442	465	1,200	1,360	2,040
4	......	805	745	3,000	5,780	5.020	540	355	490	1,200	1,360	2,410
5	......	775	745	4,000	5,270	4.900	261	442	565	1,060	1,440	3,520
6	......	745	745	4,000	5,270	4,900	465	620	765	1,200	1,520	4,180
7	......	755	745	4,000	5.020	4,530	565	620	925	1,200	2,220	4,070
8	......	770	745	4.000	4,900	4,180	860	592	925	1,280	3,960	3,850
9	......	785	745	9,590	4,770	3,850	620	540	925	1,200	3,850	3,850
10	......	800	675	8,050	4,650	3,850	398	620	925	925	3,630	3,630
11	......	815	605	7,450	4,290	3,850	316	490	592	1,280	3,010	3,630
12	......	825	605	5,140	4,070	3,210	442	592	442	1,360	3,010	3,410
13	......	810	745	4,770	4,070	3,210	398	765	565	1,280	3,410	3,210
14	......	795	490	4,770	3,850	3,010	375	620	1,060	1,200	3,850	3,210
15	......	780	605	5,020	3,630	2,610	490	540	925	1,200	3,850	3,310
16	......	760	745	5.640	3,630	2,610	490	261	925	1,130	3,740	3,520
17	......	745	1,000	6,730	3,850	2,810	442	442	860	828	3,630	4,290
18	......	745	825	8,200	4,070	2,040	375	375	795	735	3,410	5,270
19	......	745	1,200	8,650	4.070	2,220	335	490	795	1,060	2,810	5,140
20	......	545	1,540	8,050	3,850	2,040	316	565	925	1,130	3,010	5,020
21	......	545	1,540	7,750	4,070	1,770	279	465	925	1,060	2,910	4,770
22	......	545	1,420	7,750	4,530	1,680	244	490	1,060	1,060	2,810	4,770
23	......	515	1,200	7,900	4,770	1,520	795	490	1,060	1,060	2,710	4,770
24	......	1,000	1,200	8,650	4.650	1.360	465	540	1.130	925	2,610	4,650
25	......	910	1,100	8,650	4,900	1,200	442	1,130	1,200	1,520	2,810	4,530
26	......	825	910	8,500	4,770	1,060	375	828	1,200	1,860	2,910	4,650
27	......	785	910	8,200	4,650	1,060	355	648	1,200	1,520	2,810	4,530
28	......	675	910	7,900	4,770	1,130	925	515	1,280	1,520	2,710	4,410
29	......	675	1,540	7,450	5,140	1,060	420	316	1,360	1,440	2,610	4,530
30	......	......	2,000	7,160	6,590	925	420	86	1,360	1,360	2,410	4,530
31	......	......	2,000	......	9,910	......	515	316	......	1,200	......	4,290

NOTE.—Daily discharge Apr. 9 to Dec. 31, determined from a well-defined rating curve. Daily discharge Feb. 1 to Apr. 8, obtained by means of a well-defined rating curve based on measurements made under ice cover and comparison with the discharge at Piercefield.

Monthly discharge of Raquette River at Massena Springs, N. Y., for 1912.

[Drainage area, 1,170 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	......	......	[a] 1,500	1.28	1.48	D.
February	1,000	515	763	.652	.70	C.
March	[a] 2,000	490	972	.831	.96	C.
April	9,590	[a] 2,000	6,230	5.32	5.94	B.
May	9,910	3,630	4,940	4.22	4.86	B.
June	8,050	925	3,070	2.62	2.92	B.
July	925	244	479	.409	.47	A.
August	1,130	86	516	.441	.51	A.
September	1,360	375	881	.753	.84	A.
October	1,860	735	1,210	1.03	1.19	A.
November	3,960	1,200	2,760	2.36	2.63	B.
December	5,270	2,040	3,940	3.37	3.88	B.
The year	9,910	86	2,270	1.94	26.38	

[a] Estimated by means of comparison with the discharge at Piercefield.

BOG RIVER NEAR TUPPER LAKE, N. Y.

Location.—Mouth of Bog River, head of Tupper Lake, 1½ miles below junction of Bog River and the outlet from Round Pond.

Records available.—August 24, 1908, to June 30, 1912. Published also in annual reports of the New York State Water-Supply Commission and the New York State engineer and surveyor.

Drainage area.—132 square miles.

Gage.—Staff, fastened to the left wing wall of an unused dam; read once daily; datum unchanged.

Channel.—Possibly shifting, as the bed is composed of rock on one side and gravel on the other. The crest of the dam with the brink of the adjacent falls forms a control point considered permanent.

Discharge measurements.—Made from a cable about 1½ miles above the gage and immediately below the mouth of the outlet of Round Pond.

Artificial control.—The flow is more or less regulated during the spring for log driving. The operation of a small power plant on the main stream causes some fluctuation in the daily gage heights during the low-water periods in the summer.

Winter flow.—The gage heights are usually not observed during December to March on account of ice.

Accuracy.—Discharge curve fairly well developed. Estimates good.

Discharge measurements of Bog River near Tupper Lake, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 17	Frank Weber	2.52	331
17	....do	2.57	336

Daily gage height, in feet, and discharge, in second-feet, of Bog River near Tupper Lake, N. Y., for 1912.

[B. O. Lott, observer.]

Day.	March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.4	285	4.0	940	3.5	700
1			2.4	285	3.6	745	3.4	655
3			2.4	285	3.2	570	3.4	655
4			2.5	315	3.0	490	3.4	655
5			2.6	350	2.8	420	3.4	655
6			2.6	350	2.8	420	3.4	655
7			2.6	350	2.7	385	3.3	610
8			2.6	350	2.6	350	3.0	490
9			2.5	315	2.6	350	2.8	420
10			2.6	350	2.5	315	2.6	350
11			2.6	350	2.4	285	2.5	315
12			2.6	350	2.5	315	2.4	285
13			2.6	350	2.5	315	2.4	285
14			2.8	420	2.5	315	2.3	255
15			2.9	455	2.4	285	2.1	205
16			3.5	700	2.4	285	2.0	180
17			4.5	1,190	2.5	315	1.9	160
18			4.6	1,240	2.6	350	1.8	140
19			4.6	1,240	2.6	350	1.7	120
20			4.5	1,190	2.7	385	1.6	105
21			4.4	1,140	2.8	420	1.6	105
22	2.2	230	4.6	1,240	3.1	530	1.5	90
23		230	4.6	1,240	3.6	745	1.5	90
24		230	4.6	1,240	3.5	700	1.5	90
25	2.2	230	4.6	1,240	3.4	655	1.5	90
26		240	4.6	1,240	3.3	610	1.4	75
27		250	4.6	1,240	3.3	610	1.4	75
28	2.3	255	4.6	1,240	3.3	610	1.3	60
29		255	4.5	1,190	3.5	700	1.3	60
30		255	4.2	1,040	3.7	790	1.3	60
31	2.3	255			3.7	790		

NOTE.—The relation of gage height to discharge probably affected by ice from Mar. 22 to 31. Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Bog River near Tupper Lake, N. Y., for 1912.

[Drainage area, 132 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
April	1,240	285	759	5.75	6.42	C.
May	940	285	495	3.75	4.32	B.
June	700	60	290	2.20	2.46	B.

ST. REGIS RIVER AT BRASHER CENTER, N. Y.

Location.—At the steel highway bridge in the village of Brasher Center, 5 miles downstream from Brasher Falls, 6¼ miles below the junction of East and West branches of St. Regis River, and about 12 miles above the mouth.

Records available.—August 22, 1910, to December 31, 1912. Data published also in annual reports of State Water-Supply Commission and State Conservation Commission of New York.

Drainage area.—621 square miles.

Gage.—Chain, fastened to downstream side of bridge; read twice daily; datum unchanged.

Channel.—Very rough; composed of gravel and large bowlders; considered permanent. At high stages current swift and water rough.

Discharge measurements.—At low stages made by wading about 500 feet above the bridge; at high stages, from the bridge.

Winter flow.—Relation of gage height to discharge affected by ice.

Accuracy.—Discharge rating curve well defined. Estimates good.

Discharge measurements of St. Regis River at Brasher Center, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 21[a]	Frank Weber	5.64	442
Apr. 11	....do	6.18	3,600
14	....do	5.85	2,870
18	....do	6.70	5,440
May 14	....do	5.09	1,410
July 25[b]	G. H. Canfield	4.15	341
Oct. 23	J. G. Mathers	4.38	523

[a] Complete ice cover, control frozen. [b] Made by wading.

Daily gage height, in feet, of St. Regis River at Brasher Center, N. Y., for 1912.

[Joseph Vanier, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	......	......	7.7	5.35	6.5	4.17	4.26	4.40	5.3	4.65	4.85
2	6.6	......	......	7.2	5.3	6.2	4.17	4.28	4.48	5.1	4.6	5.1
3	6.8	......	......	6.8	5.15	6.0	4.13	4.22	4.75	5.0	4.65	6.4
4	7.0	......	......	6.6	4.9	5.7	4.06	4.32	4.8	4.9	4.7	5.6
5	7.0	......	......	6.6	4.9	5.5	4.03	4.45	4.8	4.75	4.6	5.5
6	7.4	......	......	8.4	5.0	5.35	4.13	4.5	4.9	4.6	4.6	5.5
7	......	......	......	8.0	5.05	5.25	4.13	4.46	4.95	4.6	4.7	5.4
8	......	......	......	7.2	5.15	5.25	4.05	4.48	4.9	4.55	6.0	5.3
9	......	......	......	6.7	5.15	5.2	4.03	4.38	4.8	4.48	5.95	5.2
10	......	......	......	6.5	5.15	5.0	4.01	4.3	4.6	4.40	5.8	5.1
11	......	......	......	6.2	5.15	4.9	4.05	4.29	4.7	4.45	5.5	5.0
12	......	......	......	6.2	5.05	4.85	4.03	4.26	4.7	4.5	5.25	5.0
13	......	......	......	6.2	5.0	4.9	3.99	4.3	4.65	4.6	5.15	5.15
14	......	......	......	5.9	5.05	4.9	3.95	4.32	4.6	4.7	5.5	5.3
15	......	......	......	6.0	5.05	4.85	3.97	4.3	4.5	4.7	5.5	5.35
16	......	......	......	6.9	4.95	4.8	4.05	4.3	4.7	4.6	5.4	4.9
17	......	......	......	6.7	5.0	4.7	4.07	4.22	4.9	4.6	5.3	5.1
18	......	......	......	6.7	5.25	4.7	4.03	4.18	4.9	4.5	5.2	5.25
19	......	......	......	6.7	5.35	4.65	3.99	4.20	4.9	4.5	5.1	5.0
20	......	......	......	6.6	5.25	4.44	3.95	4.18	5.1	4.48	5.0	5.1
21	......	5.64	......	6.4	4.85	4.5	4.00	4.16	5.15	4.35	4.9	5.5
22	......	......	......	5.5	5.6	4.46	4.27	4.15	5.1	4.18	4.9	5.85
23	......	......	......	5.9	5.6	4.43	4.37	4.18	5.1	4.28	4.95	6.2
24	......	......	......	6.2	5.6	4.37	4.37	4.22	5.15	4.42	4.95	6.2
25	......	......	......	6.3	5.45	4.35	4.18	4.25	5.2	4.85	4.95	6.2
26	......	......	......	5.9	5.25	4.34	4.15	4.35	5.1	5.1	4.9	6.1
27	......	......	......	5.95	5.15	4.30	4.10	4.75	5.1	5.2	4.8	5.95
28	......	......	......	5.6	5.05	4.27	4.04	4.9	5.1	5.1	4.75	5.75
29	......	......	......	5.35	6.2	4.27	4.08	4.7	5.2	4.9	4.8	5.6
30	......	......	......	5.5	7.2	4.19	4.22	4.5	5.3	4.8	4.75	5.6
31	......	......	......	......	7.2	......	4.25	4.42	......	4.6	......	5.9

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to Mar. 31.

Daily discharge, in second-feet, of St. Regis River at Brasher Center, N. Y., for 1910–1912.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.						
1	......	......	250	250	897	455
2	......	......	238	238	897	616
3	......	......	309	238	722	569
4	......	......	284	329	834	722
5	......	......	273	377	834	834
6	......	......	309	438	960	722
7	......	......	1,240	1,390	1,100	......
8	......	......	1,390	1,900	960	......
9	......	......	1,030	1,720	834	......
10	......	......	722	1,390	834	......
11	......	......	569	1,030	1,170	......
12	......	......	446	778	1,240	......
13	......	......	377	522	1,100	......
14	......	......	329	400	960	......
15	......	......	309	400	778	......
16	......	......	329	329	834	......
17	......	......	309	400	722	......
18	......	......	296	423	569	......
19	......	......	296	362	616	......
20	......	......	238	400	669	......
21	......	......	250	329	505	......
22	......	329	250	238	522	......
23	......	273	273	250	522	......
24	......	213	238	329	455	......
25	......	244	250	616	616	......
26	......	267	238	1,470	616	......
27	......	329	250	1,810	616	......
28	......	198	284	1,900	616	......
29	......	166	296	1,720	569	......
30	......	30	250	1,640	505	......
31	......	213	......	1,170	......	......

Daily discharge, in second-feet, of St. Regis River at Brasher Center, N. Y., for 1910–1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.									
1	2,530	3,740	925	690	438	342	561	619	1,760
2	2,130	5,440	860	638	415	279	590	860	1,760
3	2,330	4,040	990	690	308	262	561	925	1,430
4	1,940	3,740	990	742	296	279	742	742	1,200
5	1,510	2,960	925	690	342	308	1,270	638	1,060
6	10,000	2,740	990	619	392	342	1,590	638	860
7	10,000	2,230	1,060	742	446	925	1,430	742	990
8	9,000	2,130	801	590	438	990	1,200	1,130	860
9	7,450	1,940	860	619	376	860	990	1,430	1,200
10	5,060	1,850	1,130	552	472	590	860	1,350	1,430
11	4,360	1,760	801	561	342	454	590	1,350	1,850
12	3,740	1,760	990	590	279	524	542	1,350	2,130
13	4,360	1,430	1,130	362	369	498	690	1,060	3,460
14	5,440	1,350	1,430	342	322	524	619	1,060	3,460
15	5,830	1,510	1,510	296	296	590	524	990	2,740
16	5,830	690	1,680	342	342	524	507	925	2,530
17	5,830	1,060	1,430	296	322	472	524	990	1,850
18	5,060	860	1,200	472	302	438	590	1,130	1,760
19	3,460	925	860	415	322	542	690	1,510	1,940
20	3,740	690	742	498	415	542	285	1,430	1,760
21	3,080	742	860	392	454	524	638	1,350	1,680
22	3,740	801	990	369	415	415	638	1,350	1,590
23	3,740	990	801	308	392	392	590	1,130	2,230
24	3,200	860	638	296	392	415	619	628	2,330
25	3,200	3,080	524	342	454	392	498	990	1,940
26	3,740	2,230	524	279	384	498	590	860	1,940
27	4,040	1,680	742	362	472	800	580	860	1,760
28	3,740	1,350	742	240	342	1,270	561	925	1,760
29	4,040	1,350	690	302	498	561	552	1,590	....
30	3,740	1,060	742	225	472	498	524	1,850	....
31	....	925	....	240	524	....	619	....	....
1912.									
1	9,630	1,850	4,700	356	423	542	1,760	801	1,060
2	7,450	1,760	3,740	356	438	619	1,430	742	1,430
3	5,830	1,510	3,200	328	392	925	1,270	801	4,360
4	5,060	1,130	2,530	285	472	990	1,130	860	2,330
5	5,060	1,130	2,130	267	590	990	925	742	2,130
6	12,900	1,270	1,850	328	638	1,130	742	742	2,130
7	11,000	1,350	1,680	328	600	1,200	742	860	1,940
8	7,450	1,510	1,680	279	619	1,130	690	3,200	1,760
9	5,440	1,510	1,590	267	524	990	619	3,080	1,590
10	4,700	1,510	1,270	256	454	742	542	2,740	1,430
11	3,740	1,510	1,130	279	446	860	590	2,130	1,270
12	3,740	1,350	1,060	267	423	860	638	1,680	1,270
13	3,740	1,270	1,130	245	454	801	742	1,510	1,510
14	2,960	1,350	1,130	225	472	742	860	2,130	1,760
15	3,200	1,350	1,060	235	454	638	860	2,130	1,850
16	6,220	1,200	990	279	454	860	742	1,940	1,130
17	5,440	1,270	860	291	392	1,130	742	1,740	1,430
18	5,440	1,680	860	267	362	1,130	638	1,590	1,680
19	5,440	1,850	801	245	376	1,130	638	1,430	1,270
20	5,060	1,680	580	225	362	1,430	619	1,270	1,430
21	4,360	1,060	638	250	349	1,510	498	1,130	2,130
22	2,130	2,330	600	431	342	1,430	362	1,130	2,850
23	2,960	2,330	571	516	362	1,430	438	1,200	3,740
24	3,740	2,330	516	516	392	1,510	561	1,200	3,740
25	4,040	2,040	498	362	415	1,590	1,060	1,200	3,740
26	2,960	1,680	489	342	498	1,430	1,430	1,130	3,460
27	3,080	1,510	454	308	925	1,430	1,590	990	3,080
28	2,330	1,350	431	273	1,130	1,430	1,430	925	2,640
29	1,850	3,740	431	296	860	1,590	1,130	990	2,330
30	2,130	7,450	369	392	638	1,760	990	925	2,330
31	....	7,450	....	415	561	....	742	....	2,960

NOTE.—Daily discharge for 1910 determined from a rating curve based on one measurement and the shape of the rating curve for 1911–12. Daily discharge for 1911 and 1912 determined from a rating curve well defined below 7,000 second-feet. Daily discharge Apr. 6 to 8, 1911, estimated on account of ice jams.

Monthly discharge of St. Regis River at Brasher Center, N. Y., for 1910–1912.

[Drainage area, 621 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910.						
August 22-31	329	30	226	0.364	0.14	B.
September	1,390	238	404	.651	.73	B.
October	1,900	238	800	1.29	1.49	B.
November	1,240	455	769	1.24	1.38	B.
December	....	....	700	1.13	1.30	D.
1911.						
January	....	....	1,250	2.01	2.32	D.
February	....	....	730	1.18	1.23	D.
March	....	....	1,600	2.58	2.97	D.
April	....	1,510	4,530	7.29	8.13	C.
May	5,440	690	1,870	3.01	3.47	A.
June	1,680	524	952	1.53	1.71	A.
July	742	225	455	.733	.85	A.
August	524	279	388	.625	.72	A.
September	1,270	262	537	.865	.97	A.
October	1,590	285	702	1.13	1.30	A.
November	1,850	619	1,080	1.74	1.94	A.
December	3,460	860	1,820	2.93	3.38	B.
The year	....	....	1,330	2.14	28.99	
1912.						
January	....	....	780	1.26	1.45	D.
February	....	....	370	.596	.64	D.
March	....	....	460	.741	.85	D.
April	12,900	1,850	4,970	8.00	8.93	B.
May	7,450	1,060	2,010	3.24	3.74	A.
June	4,700	369	1,300	2.09	2.33	A.
July	516	225	313	.504	.58	A.
August	1,130	342	510	.821	.95	A.
September	1,760	542	1,130	1.82	2.03	A.
October	1,760	362	876	1.41	1.63	A.
November	3,200	742	1,430	2.30	2.57	A.
December	4,360	1,060	2,190	3.53	4.07	A.
The year	12,900	225	1,360	2.19	29.77	

NOTE.—Discharge for Dec. 7, 1910, to Mar. 31, 1911, and Dec. 29, 1911, to Mar. 31, 1912, estimated by means of comparison with the flow of Raquette and Oswegatchie Rivers.

Mean discharge Dec. 7-31, 1910, estimated 710 second-feet.

Mean discharge Dec. 29-31, 1911, estimated 1,700 second-feet.

DEER RIVER AT IRONTON, N. Y.

Location.—About 1,000 feet below steel highway bridge in the village of Brasher Iron Works (railroad station is Ironton) and 2 miles above the confluence of Deer River with St. Regis River in Helena. There are no important tributaries between the gage and the mouth of the river. A small creek enters from the left about 1 mile above the station.

Records available.—July 25 to December 31, 1912.

Drainage area.—206 square miles.

Gage.—Inclined staff gage 32 feet long, reading from 0.5 to 11.0 feet, about 1,000 feet below the bridge and 500 feet below the remains of an old wooden dam; an auxiliary vertical staff, fastened on the upstream side of the right abutment, is to be used as a reference while making measurements and to determine the effect of the removal of the dam below.

Channel.—Bed at the bridge is solid rock and smooth. A gravel control about 300 feet below the gage is probably permanent.

Discharge measurements.—Made from the bridge during medium and high stages and by wading a short distance above at low stages.

Winter flow.—Relation of gage height to discharge will probably be affected by ice during the winter months.

Accuracy.—Rating curve good for low stages. Upper portion not well defined. Estimates as published good.

Cooperation.—Gage heights furnished by M. W. Lantry, Hogansburg, N. Y.

Discharge measurements of Deer River at Ironton, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 25[a]	G. H. Canfield	1.13	51.3
Oct. 22	J. G. Mathers	1.68	130
25	....do	2.66	397

[a] Measurement made by wading.

Daily gage height, in feet, and discharge, in second-feet, of Deer River at Ironton, N. Y., for 1912.

[Alex. Barlow, observer.]

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	......	......	1.39	84	1.49	98	2.85	465	1.9	175	2.3	279
2	......	......	1.38	82	1.66	126	2.5	341	2.0	199	4.8	1,680
3	......	......	1.35	78	1.85	164	2.3	279	1.92	180	5.8	2,810
4	......	......	1.52	102	1.80	153	2.2	251	1.8	153	3.3	656
5	......	......	1.64	122	1.72	137	2.05	212	1.75	143	3.0	524
6	......	......	1.58	112	1.60	115	1.91	177	1.7	133	3.1	566
7	......	......	1.49	98	1.88	171	1.95	187	2.1	225	3.0	524
8	......	......	1.44	91	2.4	309	1.78	149	5.8	2,810	2.45	325
9	......	......	1.44	91	2.1	225	1.70	133	4.0	1,050	2.25	265
10	......	......	1.46	93	1.99	197	1.76	145	3.3	656	2.5	341
11	......	......	1.42	88	1.95	187	1.75	143	2.8	446	2.45	325
12	......	......	1.31	72	2.2	251	1.80	153	2.6	375	2.55	358
13	......	......	1.44	91	1.92	180	2.1	225	2.5	341	2.65	392
14	......	......	1.42	88	1.89	173	1.98	194	4.1	1,120	2.9	484
15	......	......	1.35	78	1.85	164	1.88	171	3.6	808	2.6	375
16	......	......	1.31	72	2.55	358	1.78	149	3.3	656	2.5	341
17	......	......	1.28	69	2.2	251	1.71	135	3.1	566	2.7	410
18	......	......	1.15	54	2.1	225	1.61	117	2.95	504	2.85	465
19	......	......	1.12	51	2.5	341	1.68	129	2.6	375	3.8	920
20	......	......	1.06	45	2.8	446	1.74	141	2.7	410	3.2	610
21	......	......	1.19	58	2.8	446	1.61	117	2.6	375	3.4	704
22	......	......	1.16	55	2.45	325	1.62	119	2.4	309	3.4	704
23	......	......	1.20	59	2.3	279	1.58	113	2.25	265	3.4	704
24	......	......	1.19	58	2.8	446	1.60	115	2.2	251	3.5	754
25	1.12	51	1.52	102	2.65	392	2.4	309	2.1	225	3.8	920
26	1.09	48	1.69	131	2.5	341	2.7	410	2.25	265	3.7	864
27	1.10	49	2.15	238	3.1	566	2.45	325	2.35	294	3.6	808
28	1.11	50	2.05	212	2.7	410	2.25	265	2.3	279	3.6	808
29	1.22	61	1.72	137	2.75	428	2.1	225	2.35	294	3.4	704
30	1.36	79	1.44	91	3.5	754	2.55	358	2.55	358	3.3	656
31	1.35	78	1.64	122	......	......	1.95	187	......	......	3.9	960

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Deer River at Ironton, N. Y., for 1912.

[Drainage area, 206 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
July 25-31	79	48	59.4	0.288	0.07	A.
August	238	45	94.3	.458	.53	A.
September	754	98	289	1.40	1.56	A.
October	465	113	208	1.01	1.16	A.
November	2,810	133	475	2.31	2.58	A.
December	2,810	265	686	3.33	3.84	A.

LAKE CHAMPLAIN AT BURLINGTON, VT.

Location.—On the south side of the roadway leading to the dock of the Champlain Transportation Co. at Burlington, Vt., at a point about 80 feet from the road at the foot of King Street.

Records available.—May, 1907, to December 31, 1912.

Gage.—Staff; read once daily. Comparison of gage readings, made under the direction of Prof. A. D. Butterfield on calm days during 1907-8, indicate that the zero of the gage at Burlington is at practically the same elevation as that of the gage at Fort Montgomery, namely, 92.50 feet above mean sea level.

Cooperation.—Gage heights at Burlington furnished through the courtesy of Mr. D. A. Loomis, general manager of the Champlain Transportation Co.

Daily gage height, in feet, of Lake Champlain at Burlington, Vt., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	2.30	......	3.50	7.20	6.08	3.80	2.05	......	1.90	2.38	2.90
2	2.80	2.30	1.72	3.78	6.89	......	3.70	2.00	1.50	1.90	2.35	2.90
3	2.80	2.30	......	3.90	6.80	6.40	3.60	2.00	1.48	1.88	......	2.90
4	2.80	......	......	3.90	6.70	6.40	3.60	......	1.48	1.88	2.35	2.90
5	2.70	2.30	1.72	3.98	......	6.40	3.50	2.00	1.45	1.88	2.40	2.90
6	2.65	......	......	4.25	6.60	6.30	3.50	1.95	1.45	......	2.40	3.00
7	......	......	......	......	6.40	6.20	......	1.90	1.43	1.85	2.40	3.03
8	2.57	......	......	5.39	6.20	6.10	3.30	1.90	......	1.85	2.70	......
9	2.55	......	1.74	6.00	6.10	......	3.20	1.90	1.43	1.80	3.00	3.05
10	2.40	2.10	......	6.29	6.00	6.00	......	1.85	1.40	1.80	......	3.00
11	2.40	......	......	6.38	5.93	5.90	......	......	1.40	1.78	3.20	2.97
12	2.30	......	1.74	6.41	......	5.83	3.00	1.85	1.40	1.75	3.22	2.98
13	2.28	......	......	6.49	5.70	5.75	2.90	1.85	1.38	......	3.30	2.95
14	......	2.10	......	......	5.60	5.66	......	1.80	1.38	1.75	3.35	2.95
15	2.15	......	......	6.45	5.50	5.50	2.75	1.80	......	1.70	3.40	2.93
16	2.15	......	1.78	6.65	5.50	......	2.60	1.75	1.40	1.70	3.50	2.90
17	2.18	2.00	......	6.87	5.50	5.40	2.55	1.75	1.45	1.70	3.50	2.90
18	2.18	1.90	1.88	7.05	5.50	5.20	2.50	......	1.50	1.70	3.48	2.90
19	2.18	......	2.05	7.20	......	5.00	2.48	1.75	1.60	1.70	3.45	2.90
20	2.18	1.70	2.20	7.32	5.50	4.90	2.48	1.72	1.60	......	3.40	2.90
21	......	......	2.28	......	5.50	4.82	......	1.70	1.65	1.70	3.40	2.90
22	2.25	......	2.48	7.25	5.65	4.70	2.50	1.70	......	1.70	3.40	......
23	2.47	1.72	2.58	7.33	5.65	......	2.50	1.70	1.80	1.80	3.40	2.95
24	2.60	......	......	7.35	5.63	4.60	2.40	1.65	1.88	1.85	3.60	2.98
25	2.60	......	2.65	7.42	5.60	4.50	2.30	1.62	1.90	1.92	3.58	2.98
26	2.60	1.72	2.68	7.48	5.60	4.50	2.30	1.56	1.90	2.28	3.42	2.95
27	2.60	......	2.68	7.55	......	4.20	2.20	1.53	1.88	......	3.40	2.93
28	......	......	2.70	......	......	4.10	......	1.50	1.88	2.50	3.20	2.93
29	2.60	1.72	2.82	7.55	......	4.00	2.20	1.50	......	2.45	3.10	......
30	2.60	......	3.00	7.30	5.90	......	2.10	1.50	1.90	2.42	3.00	2.90
31	2.60	......	......	......	5.95	......	2.05	1.50	......	2.40	......	2.90

NOTE.—Lake frozen completely over Jan. 26. Thickest ice noted 14 inches. No information as to date on which the lake opened. Ice was 5½ inches thick Apr. 10.

RICHELIEU RIVER AT FORT MONTGOMERY, N. Y.

Location.—About half a mile from the head of Richelieu River at the outlet of Lake Champlain, about 1 mile northeast of the village of Rouses Point and three-eighths of a mile south of the Canadian boundary; in the fort.

Records available.—1875 to 1912; data published in the reports of the Deep Waterways Survey, the annual reports of the State engineer and surveyor of the State of New York, and in the water-supply papers of the United States Geological Survey.

Drainage area.—8,180 square miles at Chambly.

Gage.—Staff; read once daily. Elevation of gage zero at Fort Montgomery is 92.50 feet above mean sea level; high-water level is at elevation 101.6 feet; probably lowest elevation recorded at Fort Montgomery is 91.9 feet November 13, 1908. Gage heights are given as sea-level elevations.

Determination of flow.—The daily discharge of the lake has been determined from observations of depth and discharge over the Chambly dam, 35 miles below the head of Richelieu River, made in 1898 by the United States Board of Deep Waterways. A discharge rating curve has been constructed from the observations at Chambly dam and the gage readings at Rouses Point. The area tributary to the river between Rouses Point and Chambly is 310 square miles.

Winter flow.—Relation of gage height to discharge probably affected by ice, as the entire surface of Lake Champlain freezes over nearly every winter.

Cooperation.—Observations of gage heights are made under the direction of the Corps of Engineers of the United States Army. Gage readings reported weekly to the Survey through the courtesy of Maj. Edward Burr.

Accuracy.—Estimates of daily discharge since 1907 are withheld pending verification of the rating curve.

Daily gage height, in feet, of Richelieu River at Fort Montgomery, N. Y., for 1911–12.

[Wm. McComb, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	93.9	94.3	94.2	95.3	98.6	96.25	94.55	93.6	93.05	93.0	93.3	93.9
2	93.95	....	94.15	95.3	98.5	96.05	94.55	93.6	93.2	92.9	93.3	93.9
3	93.95	94.4	94.1	95.35	98.5	96.0	94.5	93.65	92.95	92.95	93.45	93.8
4	94.05	94.45	94.1	95.3	98.6	95.95	94.45	93.6	92.95	93.45	93.5	93.9
5	94.35	94.35	94.05	95.4	98.65	95.9	94.4	93.5	93.0	92.95	93.45	94.0
6	94.25	94.4	94.05	95.45	98.5	95.8	94.5	93.45	93.15	92.85	93.45	93.9
7	94.35	94.4	94.1	95.8	98.35	95.7	94.25	93.45	92.95	92.95	93.5	93.9
8	94.45	94.35	94.05	96.3	98.35	95.65	94.3	93.6	92.95	93.15	93.4	93.85
9	94.4	94.35	94.1	96.4	98.2	95.55	94.25	93.4	93.2	93.05	93.4	94.0
10	94.45	94.3	94.05	96.65	98.05	95.5	94.3	93.35	93.0	93.05	93.7	94.0
11	94.6	94.3	94.0	97.0	98.05	95.5	94.15	93.25	93.0	93.1	93.5	94.15
12	94.35	94.35	94.05	97.2	98.0	95.65	94.15	93.25	92.9	93.05	93.9	93.95
13	94.5	94.3	94.0	97.3	97.8	95.6	94.05	93.3	92.9	93.0	93.45	94.05
14	94.45	94.25	94.05	....	97.8	95.45	94.1	93.25	92.95	93.05	93.5	94.25
15	94.4	94.35	94.05	....	97.9	95.4	94.0	93.25	93.4	93.1	93.5	94.45
16	94.45	94.25	94.1	....	97.5	95.3	94.15	93.15	93.0	93.0	93.4	94.45
17	94.4	94.3	94.15	....	97.5	95.25	94.1	93.15	92.9	93.1	93.5	94.55
18	94.5	94.25	94.2	....	97.4	95.3	93.9	93.25	92.95	93.2	93.4	94.65
19	94.55	94.3	94.25	96.15	97.3	95.25	93.9	93.1	93.0	93.15	93.65	94.7
20	94.4	94.25	94.25	96.25	97.4	95.15	94.0	93.1	92.9	93.2	93.6	94.8
21	94.45	94.2	94.25	96.3	97.2	95.05	93.9	93.2	92.95	93.3	93.55	94.75
22	94.35	94.2	94.2	96.35	97.0	95.1	93.8	93.4	92.95	93.35	93.6	95.0
23	94.35	94.25	94.25	96.3	96.9	94.9	93.75	92.95	93.0	93.35	93.9	94.8
24	94.35	94.2	94.25	96.3	97.0	94.9	93.95	93.15	93.15	93.45	93.65	95.0
25	94.3	94.25	94.3	96.2	96.7	95.0	93.95	93.1	92.9	93.5	93.6	95.2
26	94.3	94.25	94.35	96.25	96.7	94.9	93.7	93.15	92.95	93.4	93.7	95.25
27	94.3	94.2	94.5	96.3	96.6	94.95	93.65	93.15	93.2	93.5	93.7	95.7
28	94.25	94.2	94.65	96.25	96.6	94.8	93.6	93.2	92.9	93.5	93.9	95.2
29	94.45	....	94.85	96.35	96.4	94.6	93.75	93.0	93.0	93.65	94.0	95.3
30	94.3	....	95.05	96.4	96.3	94.6	93.65	93.0	92.9	93.3	93.9	95.25
31	94.3	....	95.2	....	96.2	....	93.6	93.05	....	93.45	....	95.3
1912.												
1	95.2	94.5	94.2	95.75	99.4	98.5	96.2	94.45	93.9	94.25	95.2	95.5
2	95.25	94.5	94.2	95.9	99.3	98.7	96.0	94.5	93.9	94.2	94.75	96.0
3	95.2	94.4	94.15	96.2	99.15	98.8	96.1	94.3	93.8	94.45	94.75	95.3
4	95.2	94.4	94.15	96.3	99.0	98.8	96.0	94.35	93.75	94.25	95.1	95.6
5	95.15	94.4	94.1	96.4	98.9	98.7	95.95	94.3	93.8	94.3	94.8	95.5
6	95.1	94.4	94.15	96.5	99.0	98.8	95.9	94.4	93.7	94.25	94.9	95.7
7	95.1	94.45	94.1	97.0	98.7	98.5	95.85	94.35	93.9	94.4	94.8	95.5
8	95.1	94.35	94.05	97.7	98.6	98.7	95.75	94.4	93.8	94.2	95.0	95.8
9	95.1	94.4	94.1	98.35	98.4	98.3	95.6	94.5	93.7	94.3	95.2	95.6
10	95.00	94.3	94.05	98.6	98.3	98.4	95.6	94.5	93.9	94.1	95.35	95.9
11	94.95	94.3	94.1	98.75	98.4	98.2	95.5	94.2	93.8	94.15	95.55	95.5
12	94.95	94.25	94.1	98.8	98.3	98.3	95.5	94.25	93.8	94.45	95.6	95.5
13	94.95	94.3	94.05	98.8	98.3	97.9	95.5	94.2	93.9	94.15	95.5	95.6
14	95.0	94.3	94.15	98.85	98.0	98.0	95.4	94.25	94.05	94.1	95.7	95.65
15	94.8	94.25	94.15	98.95	98.0	98.05	95.4	94.05	93.85	94.0	95.65	95.5
16	94.8	94.2	94.25	98.95	97.9	97.9	95.1	94.05	93.8	94.1	95.7	95.4
17	94.8	94.2	94.3	99.2	97.9	97.55	95.2	94.0	94.0	94.25	95.9	95.3
18	94.8	94.2	94.4	99.5	98.0	97.5	95.1	94.15	94.05	94.15	95.8	95.3
19	94.7	94.2	94.5	99.6	97.8	97.3	95.0	94.05	94.0	94.4	96.0	95.3
20	94.8	94.25	94.6	99.7	97.9	97.4	95.05	93.9	94.1	93.9	95.8	95.25
21	94.75	94.15	94.8	99.8	97.8	97.2	95.2	94.0	94.15	93.95	96.0	95.35
22	94.6	94.25	94.95	100.0	97.95	97.1	94.8	94.1	94.4	94.2	95.7	95.3
23	94.6	94.15	95.0	99.7	98.7	97.05	94.7	93.9	94.5	94.0	95.7	95.35
24	94.6	94.2	95.0	99.9	98.2	96.9	94.7	93.85	94.35	93.95	95.7	95.35
25	94.6	94.1	95.0	99.9	98.0	96.8	94.7	93.8	94.25	94.25	95.5	95.4
26	94.55	94.1	95.1	100.05	98.1	96.6	94.6	93.9	94.3	94.6	95.8	95.4
27	94.6	94.2	95.15	100.25	98.1	96.55	94.6	93.75	94.3	94.7	95.8	95.25
28	94.55	94.2	95.0	99.6	98.1	96.6	94.55	93.85	94.25	94.65	95.6	....
29	94.55	94.2	95.2	99.6	97.5	96.3	94.5	93.7	94.2	94.9	95.7	(a)
30	94.5	....	95.35	99.5	97.9	96.2	94.5	93.75	94.25	94.8	95.6	(a)
31	94.5	....	95.6	....	98.1	....	94.5	93.8	....	94.8	....	(a)

[a] Lake closed.

SARANAC RIVER NEAR PLATTSBURG, N. Y.

Location.—At the Lozier dam of the Plattsburg Gas & Electric Co., about 6 miles above the mouth of the river at Plattsburg, N. Y.

Records available.—March 27, 1903, to December 31, 1912.

Drainage area.—624 square miles.

Gages.—The crest gage is a vertical staff located at the angle in the wing wall at the right hand end of the racks. The tail race gage is a vertical staff spiked to the crib dike between the tail race and the river about 50 feet below the power house.

Discharge measurements.—The record at this station includes the flow over a spillway crest 171.75 feet in length, the discharge through two 5-feet waste gages, when open, and the discharge through four 33-inch Victor turbines, controlled by automatic governors. Experiments have been made at Cornell University hydraulic laboratory on a model ogee section of the dam from which coefficients have been derived for the calculation of the discharge over the dam. The ratings of the waste gates and the turbines are not available.

Accuracy.—Since the turbine and waste gate ratings are not available, the data for this station is being held up until these ratings can be made.

Cooperation.—Records at this station are furnished by the Plattsburg Gas & Electric Co., Herbert A. Stutchbury, superintendent.

Discharge measurements of Saranac River near Plattsburg, N. Y., in 1912.

Date.	Hydrographer.	Gage height.[a]	Discharge.
		Feet.	*Sec. ft.*
Aug. 30	G. J. Lyon	2.06	300
30	.....do	2.79	557
31	.....do	1.99	292
31	.....do	1.84	259
31	.....do	2.23	382

[a] Gage in tail race.

AUSABLE RIVER AT AUSABLE FORKS, N. Y.

Location.—In the village of Ausable Forks, immediately below the junction of the East and West branches and about 15 miles above the mouth of the river.

Records available.—August 17, 1910, to December 31, 1912. Data also in annual reports of the New York State Water Supply Commission and New York State Conservation Commission.

Drainage area.—487 square miles.

Gage.—Chain, on the left bank, about 100 feet below the junction of East and West branches of Ausable River; read twice daily; datum unchanged.

Channel.—Bed of sand and gravel; liable to shift; channel divided by an island.

Discharge measurements.—Made from a cable about 1½ miles below the gage. At this place the river flows in one channel.

Winter flow.—Ice may form on the riffles below the gage and either divert or cause backwater.

Accuracy.—Conditions at the measuring section good. Very good discharge rating curve developed. Estimates good.

Discharge measurements of Ausable River at Ausable Forks, N. Y., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 28[a]	G. H. Canfield	3.62	183
Apr. 9	Frank Weber	5.00	2,340
10	.....do	4.55	1,430
17	C. C. Covert	6.02	5,270
May 13[b]	Frank Weber	4.44	1,290
July 29	G. H. Canfield	3.59	182

[a] Made under complete ice cover at cable; river nearly open at gage and just below.

[b] A very sudden rise took place near the finish of this measurement.

Daily gage height, in feet, of Ausable River at Ausable Forks, N. Y., for 1912.

[A. S. Baker, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.30	3.60	3.68	4.56	4.08	4.85	3.56	3.56	3.68	4.32	3.94	3.86
2	4.34	3.60	3.65	4.34	4.24	4.5	3.33	3.56	3.96	4.14	4.22	3.91
3	4.28	3.64	3.66	4.04	4.16	4.36	3.54	3.62	3.98	3.98	4.00	4.75
4	4.14	3.60	3.67	3.98	4.14	4.28	3.43	3.64	3.84	3.92	3.95	4.45
5	4.06	3.74	3.66	4.41	4.04	4.19	4.06	3.68	3.84	3.80	3.90	4.26
6	3.95	3.59	3.64	5.7	4.35	4.07	3.68	3.69	4.04	3.82	3.90	4.44
7	3.82	3.58	3.68	7.2	4.6	4.05	3.68	3.66	4.04	3.78	3.92	4.65
8	3.96	3.60	3.63	6.3	4.7	3.98	3.67	3.64	3.98	3.72	5.9	4.30
9	3.88	3.72	3.66	4.9	4.55	3.9	3.64	3.62	3.84	3.64	5.0	4.05
10	3.94	3.68	3.65	4.6	4.4	3.88	3.60	3.61	3.72	3.72	4.6	4.12
11	3.96	3.60	3.57	4.40	4.21	3.84	3.72	3.63	3.82	3.77	4.10	4.04
12	4.11	3.64	3.58	4.30	4.26	3.82	3.75	4.00	3.84	3.76	4.00	3.93
13	4.02	3.60	3.62	4.34	4.6	3.80	3.58	3.79	3.76	4.34	4.28	3.97
14	4.00	3.57	3.59	4.34	4.7	3.78	3.64	3.76	3.70	4.08	4.55	3.96
15	3.78	3.56	3.60	5.25	4.35	3.82	3.73	3.72	3.61	4.00	4.75	3.86
16	3.86	3.56	3.66	6.6	4.20	3.82	3.64	3.72	4.02	3.94	4.6	3.87
17	3.86	3.58	3.92	5.9	4.9	3.70	3.61	3.68	4.14	3.82	4.28	3.97
18	3.82	3.53	4.08	4.8	4.75	3.75	3.60	3.58	3.92	3.81	4.20	3.98
19	3.72	3.60	4.17	5.4	4.45	3.72	3.59	3.63	4.41	3.84	4.01	4.25
20	3.67	3.56	4.44	4.9	4.34	3.74	3.58	3.63	4.7	3.93	4.01	3.80
21	3.61	3.60	4.22	4.6	6.1	3.67	3.33	3.57	4.6	3.82	4.00	3.18
22	3.71	3.60	4.04	4.6	5.9	3.71	3.77	3.57	4.40	3.74	3.95	3.14
23	3.64	3.88	3.86	6.2	5.1	3.68	3.78	3.56	4.08	3.79	3.96	4.02
24	3.60	3.64	3.70	5.05	4.65	3.63	3.71	3.54	4.18	4.38	3.95	4.12
25	3.66	3.62	3.72	4.7	4.7	3.60	3.66	3.58	4.03	6.0	3.99	4.18
26	3.70	3.70	3.76	4.40	4.6	3.58	3.62	3.66	4.01	4.95	3.96	4.15
27	3.70	3.64	3.68	4.6	4.26	3.64	3.53	3.96	3.89	4.6	3.94	4.08
28	3.64	3.60	3.74	4.7	4.26	3.56	3.54	3.99	3.88	4.35	3.92	3.92
29	3.81	3.64	4.24	4.40	4.7	3.56	3.58	3.88	3.94	4.16	3.91	3.84
30	3.75	......	4.31	4.2	5.7	3.54	3.62	3.82	4.6	4.00	3.88	3.80
31	3.70	......	4.32	......	5.2	......	3.56	3.72	......	3.98	......	3.82

Note.—Relation of gage height to discharge affected by ice from about Jan. 6 to Mar. 15.

Daily discharge, in second-feet, of Ausable River at Ausable Forks, N. Y., for 1910–1912.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.						
1	......	......	194	231	348	292
2	......	......	194	231	292	292
3	......	......	202	399	329	257
4	......	......	257	311	441	273
5	......	......	388	311	694	301
6	......	......	1,130	348	889	301
7	......	......	707	543	748	431
8	......	......	231	473	388	367
9	......	......	231	367	311	292
10	......	......	292	399	388	399
11	......	......	167	508	388	301
12	......	......	292	388	473	431
13	......	......	210	292	348	441
14	......	......	210	311	339	543
15	......	......	194	257	329	616
1910.						
16	......	......	202	210	399	555
17	......	329	226	210	292	473
18	......	249	202	231	273	452
19	......	311	210	210	367	616
20	......	257	187	226	265	473
21	......	226	202	202	409	339
22	......	226	194	210	367	452
23	......	210	210	226	329	431
24	......	210	194	257	301	388
25	......	210	167	292	339	452
26	......	210	181	241	311	748
27	......	187	273	367	257	409
28	......	187	265	1,180	311	311
29	......	210	249	762	257	348
30	......	181	273	367	301	348
31	......	167	......	329	......	776

Daily discharge, in second-feet, of Ausable River at Ausable Forks, N. Y., for 1910-1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1	......	......	330	473	4,250	441	265	140	202	226	273	[illegible]
2	......	......	199	555	9,130	603	187	147	174	292	339	452
3	......	......	422	578	2,690	441	249	147	174	257	348	329
4	......	......	185	629	1,700	358	194	154	174	273	329	409
5	......	......	199	409	1,080	378	181	127	181	1,080	218	348
6	......	......	296	2,450	932	282	181	122	590	804	249	329
7	......	......	407	4,880	1,000	339	194	167	832	520	339	273
8	......	......	217	2,340	1,600	249	174	181	409	320	762	292
9	......	......	211	962	1,900	452	147	194	218	348	590	320
10	......	......	189	1,050	1,900	520	174	160	226	329	452	234
11	......	......	196	990	1,600	485	167	167	210	329	452	578
12	......	......	217	1,000	1,800	578	140	134	226	265	531	1,700
13	......	......	446	1,300	1,420	1,330	167	140	241	226	1,210	4,250
14	......	......	388	2,570	776	1,020	117	147	210	218	681	2,000
15	......	......	426	3,940	707	818	117	140	210	226	485	1,230
16	......	......	585	2,340	508	904	154	167	249	218	388	832
17	......	......	538	1,510	1,280	790	167	140	202	181	362	790
18	......	......	277	1,250	520	532	202	127	273	265	409	655
19	......	......	215	976	707	399	273	117	210	1,100	430	452
20	......	......	245	1,130	681	358	210	154	210	846	367	776
21	......	......	286	1,070	485	329	167	241	167	655	348	578
22	......	......	259	976	555	301	167	147	241	720	292	367
23	......	......	369	976	496	282	122	167	210	860	257	1,420
24	......	......	1,700	889	629	320	147	160	181	668	311	1,700
25	......	188	485	1,230	734	160	154	210	292	496	329	976
25	......	205	832	1,800	707	420	194	160	226	388	134	776
27	......	422	1,260	2,220	532	265	358	154	257	348	234	554
28	......	578	2,000	3,210	399	241	160	167	210	339	265	496
29	......	......	1,100	3,940	399	249	160	226	226	241	616	989
30	......	......	776	3,940	292	257	160	257	257	241	616	1,770
31	......	......	567	......	265	......	194	218	......	265	......	1,700
1912.												
1	1,000	155	218	1,440	694	2,000	167	167	257	1,040	520	431
2	1,070	155	199	1,070	918	1,330	51	167	643	776	889	485
3	976	181	205	642	804	1,100	154	210	567	567	590	1,900
4	776	155	211	567	776	976	92	226	409	496	532	1,250
5	668	249	205	1,180	642	846	668	257	409	367	473	947
6	426	150	192	4,250	1,080	681	257	265	642	388	473	1,330
7	310	145	218	9,510	1,510	655	257	241	642	348	496	1,000
8	434	155	185	6,210	1,700	567	249	226	567	292	4,880	[illegible]
9	362	233	205	2,110	1,420	473	226	210	409	226	2,340	655
10	416	205	199	1,510	1,160	452	194	202	292	292	1,510	748
11	434	155	148	1,160	874	409	292	218	388	339	720	642
12	587	181	154	1,000	947	388	320	590	409	329	590	508
13	493	155	178	1,070	1,510	367	181	358	329	1,070	976	555
14	472	139	159	1,070	1,700	348	226	329	273	694	1,420	543
15	278	134	165	2,940	1,080	388	301	292	202	590	1,800	431
16	345	134	241	7,270	860	388	226	292	616	520	1,510	441
17	345	145	496	4,880	2,110	273	202	257	776	388	976	555
18	310	118	694	1,900	1,800	320	194	181	496	378	860	567
19	233	165	818	3,350	1,250	292	187	218	1,180	409	603	932
20	199	142	1,230	2,110	1,070	311	181	218	1,700	508	603	367
21	162	165	889	1,510	5,530	249	51	174	1,510	388	590	[illegible]
22	225	165	642	1,510	4,880	282	339	174	1,160	311	532	[illegible]
23	181	384	431	5,870	2,570	257	348	167	694	358	543	616
24	155	192	273	2,450	1,600	218	282	154	832	1,130	532	748
25	193	178	292	1,700	1,700	194	241	181	629	5,200	578	832
26	218	232	329	1,160	1,510	181	210	241	603	2,220	543	790
27	218	192	257	1,510	947	226	147	543	462	1,510	520	694
28	181	165	311	1,700	947	167	154	578	452	1,080	496	496
29	302	192	918	1,160	1,700	167	181	452	520	804	485	409
30	256	......	1,020	860	4,250	154	210	388	1,510	590	452	367
31	218	......	1,040	......	2,820	......	167	292	......	567	......	348

NOTE.—Daily discharge determined from a well-defined rating curve. For the period during which ice was present, Feb. 25 to Mar. 23, 1911, and Jan. 6 to Mar. 15, 1912, coefficients varying from 80 to 90 per cent were applied to the open-water discharge. These coefficients are based on discharge measurements but the daily discharge for these periods can be considered only approximate.

Monthly discharge of Ausable River at Ausable Forks, N. Y., for 1910–1912.

[Drainage area, 487 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910.						
August 17-31	329	167	225	0.462	0.26	A.
September	1,130	167	271	.556	.62	A.
October	1,180	202	351	.721	.83	A.
November	889	257	383	.786	.88	A.
December	776	257	423	.869	1.00	B.
1911.						
March	2,000	185	510	1.05	1.21	B.
April	4,880	473	1,720	3.53	3.94	A.
May	9,130	265	1,340	2.75	3.17	A.
June	1,330	160	470	.965	1.08	A.
July	358	117	182	.374	.43	A.
August	257	117	164	.337	.39	A.
September	832	167	256	.526	.59	A.
October	1,100	181	437	.897	1.03	A.
November	1,210	134	421	.864	.96	A.
December	4,250	234	902	1.85	2.13	A.
1912.						
January	1,070	155	401	.823	.95	B.
February	384	118	176	.361	.39	B.
March	1,230	148	410	.842	.97	B.
April	9,510	567	2,490	5.11	5.70	A.
May	5,530	642	1,690	3.47	4.00	A.
June	2,000	154	489	1.00	1.12	A.
July	668	51	224	.460	.53	A.
August	590	154	273	.561	.65	A.
September	1,700	202	649	1.33	1.48	A.
October	5,200	226	780	1.60	1.84	A.
November	4,880	452	934	1.92	2.14	A.
December	1,800	9	679	1.39	1.60	A.
The year	9,510	9	765	1.57	27.37	

EAST CREEK NEAR RUTLAND, VT.

Location.—At Lester Bridge, on the road from Rutland to Brandon, Vt., about 3 miles north of Rutland, 2½ miles below the union of the two branches which drain Blue Ridge Mountain, and 3½ miles above the confluence with Otter River.

Records available.—August 9, 1911, to December 31, 1912.

Drainage area.—47 square miles.

Gage.—Vertical staff, fastened to the left-hand downstream side of the bridge.

Channel.—Probably permanent.

Discharge measurements.—Made from the bridge or by wading. None made during 1912.

Artificial control.—The flow of the stream is regulated by two dams near the headwaters and one dam about a mile below the station. The upper dams store considerable water. The relation between gage height and discharge is not affected by backwater from the dam below.

Accuracy.—Diurnal fluctuation of discharge caused by the operation of the mills above the station makes the computation of the mean daily flow, based on two observations, incorrect. It is considered advisable, however, to publish the gage reader's observations pending studies to determine the best use of them.

Daily gage height, in feet, of East Creek near Rutland, Vt., for 1912.

[M. Lester, observer.]

Day.	March.		April.		May.		June.		July.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1			4.05	4.35	4.0	4.08			3.35	3.5
2			3.82	4.2	3.85	3.9	4.7	4.75	3.3	3.35
3			3.7	3.7	3.8	3.9	4.7	4.7	3.5	3.5
4			3.65	3.8	3.72	3.8	4.62	4.6	3.4	3.6
5			3.72	4.75	3.68	3.6	4.55	4.5	3.55	3.62
6			4.2	5.0	3.6	3.9	4.25	4.3	3.4	3.6
7			4.6	5.35	3.75	3.82	4.25	4.0	3.45	3.45
8			5.12	4.7	3.7	3.8	3.85	3.9	3.5	3.65
9			3.88	3.8	3.62	4.0	3.72	3.7	3.4	3.5
10			3.75	3.85	3.75	4.0	3.75	3.62	3.65	3.65
11			3.8	3.82	3.8	3.6	3.4	3.4	3.55	3.6
12			3.7	4.15	3.6	3.6	3.25	3.5	3.5	3.5
13			4.0	4.02	3.75	3.8	3.55	3.65	3.5	3.6
14			4.0	3.8	3.85	3.9	3.42	3.6	3.65	3.65
15		3.8	3.75	4.4	3.72	3.88	3.48	3.5	3.4	3.55
16	3.85	3.7	4.35	5.0	3.7	4.05	3.42	3.68	3.4	3.55
17	3.7	4.0	4.7	4.7	4.65	4.5	3.6	3.6	3.3	3.7
18	3.85	4.3	4.62	4.52	4.02	4.15	3.45	3.6	3.48	3.6
19	3.9	4.45	4.95	5.0	4.1	4.2	3.4	3.5	3.65	3.75
20	4.2	4.0	4.7	4.75	4.3	4.4	3.35	3.9	3.55	3.7
21	3.8	4.0	4.7	4.7	4.6	4.68	3.3	3.2	3.55	3.75
22	3.88	3.7	4.65	4.62	4.85	4.7	3.3	3.6	3.9	3.7
23	3.7	3.78	4.7	4.7	4.62	4.6	3.25	3.4	3.55	3.72
24	3.65	3.6	4.55	4.75	4.45	4.5	3.22	3.6	3.6	3.7
25	3.5	3.62	4.6	4.6	4.12	4.0	3.2	3.58	3.6	3.75
26	3.6	3.65	4.55	4.6	3.88	3.9	3.22	3.7	3.6	3.7
27	3.5	3.85	4.75	4.55	3.75	3.8	3.3	3.7	3.55	3.7
28	3.58	3.9	4.5	4.35	3.7	3.75	3.25	3.6	3.58	3.7
29	3.85	4.7	4.3	4.3	3.5	3.85	3.2	3.55	3.75	3.75
30	3.95	4.05	4.25	4.25	4.3	4.8	3.5	3.42	3.7	3.75
31	3.72	4.2			5.0	5.35			3.7	3.5

Day.	August.		September.		October.		November.		December.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1	3.75	3.7	3.55	3.85	3.22	3.98	3.6	3.92	3.55	3.5
2	3.6	3.7	3.98	3.95	3.65	3.85	3.7	3.8	3.42	4.4
3	3.65	3.9	3.7	3.8	3.45	3.7	3.55	3.6	3.65	4.0
4	3.85	3.8	3.7	3.75	3.4	3.82	3.5	3.8	3.88	4.05
5	3.7	3.8	3.6	3.7	3.4	3.78	3.65	3.68	3.7	4.0
6	3.9	3.75	3.9	3.85	3.4	3.82	3.5	3.65	3.95	4.05
7	3.7	3.7	3.5	3.72	3.6	3.85	3.5	3.95	3.6	4.2
8	3.68	3.65	3.55	3.7	3.48	3.9	4.25	4.0	3.6	3.6
9	3.6	3.85	3.5	3.62	3.4	3.92	3.8	3.62	3.55	4.0
10	3.58	3.7	3.6	3.7	3.25	3.9	3.5	3.8	3.7	3.55
11	3.75	3.7	3.55	3.9	3.2	4.0	3.65	3.9	3.68	3.95
12	3.85	3.9	3.8	3.8	3.2	3.88	3.72	3.92	3.6	3.9
13	3.75	3.55	3.78	3.9	3.32	3.45	3.7	3.95	3.7	3.9
14	3.8	3.82	3.7	3.8	3.25	3.82	3.75	3.9	3.6	3.85
15	3.8	3.95	3.58	3.8	3.15	3.78	3.8	3.85	3.6	3.75
16	3.9	3.8	4.2	3.75	3.4	3.8	3.5	3.72	3.55	3.9
17	3.8	3.72	3.4	3.8	3.45	3.9	3.6	3.52	3.75	3.95
18	3.65	3.52	3.3	3.7	3.4	3.88	3.6	3.7	3.65	3.85
19	3.6	3.85	3.55	3.95	3.35	3.8	3.5	3.72	4.0	4.2
20	3.48	3.7	4.15	4.12	3.3	3.75	3.55	3.9	4.05	3.92
21	3.7	3.88	4.2	3.9	3.1	3.92	3.6	3.85	3.7	3.9
22	3.88	3.75	3.65	3.8	3.12	3.88	3.62	3.7	3.68	3.5
23	3.7	3.8	3.48	3.85	3.25	4.6	3.6	3.72	3.55	3.65
24	3.5	3.72	3.45	3.78	4.45	4.7	3.55	3.42	3.5	3.72
25	3.52	3.65	3.4	3.45	4.6	4.28	3.4	3.8	3.6	3.5
26	3.55	3.92	3.32	3.72	4.05	4.22	3.6	3.85	3.7	3.9
27	3.8	3.7	3.75	3.75	3.85	3.72	3.62	3.85	3.58	3.5
28	3.35	3.82	3.3	3.8	3.7	3.8	3.7	3.5	3.65	3.68
29	3.8	3.75	3.22	3.7	3.68	3.78	3.5	4.0	3.5	3.4
30	3.58	3.8	3.8	3.75	3.7	3.75	3.65	3.65	3.45	4.15
31	3.6	3.85			3.6	3.7			4.0	4.1

NOTE.—Ice went out of the creek about Mar. 15. Gage read about 6 a. m. and 6 p. m.

WINOOSKI RIVER AT MONTPELIER, VT.

Location.—At the covered wooden highway bridge near the Central Vermont Railroad station in Montpelier and near the plant of the Colton Manufacturing Co., just above the mouth of Dog River.

Records available.—May 19, 1909, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Chain, attached to the highway bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from a footbridge about half a mile below the highway bridge.

Winter flow.—Relation between gage height and discharge during the winter months is sometimes affected by ice.

Accuracy.—Diurnal fluctuation of discharge, caused by artificial control of the stream above this station, makes the computation of the mean daily flow based on two observations incorrect. A portable automatic gage was set up at this station on October 11, 1912, and a continuous record of gage heights was obtained from 4 p. m. until midnight October 12 and from 1 p. m. October 14 until October 17. The hourly gage heights recorded by this instrument are shown in the following table. Estimates of daily flow made from these hourly gage heights and from semidaily readings for October 12, 15, 16, and 17 show that estimates of daily flow based on two readings would be in error 37 per cent, 52 per cent, 61 per cent, and 66 per cent, respectively. As a good rating curve has been developed, however, it is considered advisable to publish the gage reader's observations, together with the rate of flow corresponding to each.

Hourly gage heights of Winooski River at Montpelier, Vt., from portable automatic gage.

Hour.	October.					
	11.	12.	14.	15.	16.	17.
1	....	3.43	....	4.12	4.22	3.97
2	....	3.47	....	4.11	4.19	3.97
3	....	3.53	....	4.08	4.18	3.96
4	....	3.55	....	4.08	4.15	3.95
5	....	3.55	....	4.07	4.14	3.94
6	....	3.55	....	4.04	4.14	3.94
7	....	4.07	....	4.54	4.54	4.20
8	....	4.07	....	4.59	4.54	4.52
9	....	4.07	....	4.59	4.53	4.49
10	....	4.07	....	4.55	4.54	4.37
11	....	4.06	....	4.58	4.54	4.19
Noon.	....	4.03	....	4.37	4.27	4.29
1	....	4.14	4.61	4.53	4.52	4.25
2	....	4.21	4.66	4.57	4.52	4.53
3	....	4.22	4.67	4.55	4.53	4.53
4	4.35	4.22	4.66	4.65	4.53	4.50
5	4.42	4.23	4.46	4.65	4.53	4.48
6	4.26	4.24	4.29	4.37	4.25	4.10
7	3.81	4.25	4.53	4.36	4.00	4.22
8	3.79	4.21	4.46	4.34	4.00	4.25
9	3.78	4.20	4.40	4.34	4.00	4.26
10	3.59	4.23	4.28	4.32	4.00	4.25
11	3.59	4.26	4.19	4.29	4.00	4.25
Midnight.	3.58	4.76	4.20	4.26	3.98	4.25

Discharge measurements of Winooski River at Montpelier, Vt., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 19[a]	G. H. Canfield	4.77	174
Sept. 4[b]	J. G. Mathers	4.08	203
Oct. 12[c]	C. S. De Golyer	4.01	180
13[c]	.....do	4.85	554
14[c]	.....do	4.51	341

[a] Made under complete ice cover 2,000 feet downstream from bridge.
[b] Made at foot bridge below gage.
[c] Made by wading below the gage.

Daily gage height, in feet, and discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1912.

[Raymond Colton, observer.]

Day.	January.				February.				March.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	4.6	......	4.6	......	......	......	5.0	......	......	......	5.0	......
2	4.65	......	4.65	......	......	......	4.9	......	......	......	4.9	......
3	4.6	......	4.6	......	......	......	4.7	......	......	......	4.9	......
4	4.6	......	4.6	......	......	......	4.8	......	......	......	5.05	......
5	4.5	......	4.5	......	......	......	4.8	......	......	......	5.1	......
6	4.5	......	4.5	......	......	......	4.85	......	......	......	5.0	......
7	4.6	......	4.6	......	......	......	4.8	......	......	......	5.05	......
8	4.6	......	4.6	......	......	......	4.9	......	......	......	5.2	......
9	4.65	......	4.65	......	......	......	4.8	......	......	......	5.0	......
10	4.6	......	4.6	......	......	......	4.8	......	......	......	4.9	......
11	......	......	......	......	......	......	4.9	......	......	......	5.2	......
12	4.7	......	4.7	......	......	......	4.9	......	......	......	5.2	......
13	4.7	......	4.7	......	......	......	4.8	......	......	......	5.4	......
14	......	......	......	......	......	......	4.9	......	......	......	5.3	......
15	4.9	......	4.9	......	......	......	4.8	......	......	......	5.25	......
16	4.7	......	4.7	......	......	......	4.8	......	......	......	5.4	......
17	5.1	......	5.0	......	......	......	4.7	......	......	......	5.4	......
18	4.9	......	4.9	......	......	......	4.9	......	......	......	5.9	......
19	4.7	......	4.7	......	......	......	4.7	......	......	......	6.5	......
20	5.0	......	5.0	......	......	......	4.7	......	......	......	7.5	......
21	4.9	......	4.9	......	......	......	4.8	......	......	......	6.9	......
22	4.8	......	4.8	......	......	......	5.0	......	......	......	6.1	......
23	4.8	......	4.8	......	......	......	5.05	......	......	......	6.1	......
24	4.9	......	4.9	......	......	......	4.9	......	......	......	5.3	......
25	4.8	......	4.8	......	......	......	5.0	......	......	......	5.2	......
26	4.85	......	4.85	......	......	......	4.9	......	......	......	4.9	......
27	4.8	......	4.8	......	......	......	5.0	......	......	......	4.9	......
28	4.75	......	4.75	......	......	......	5.0	......	......	......	7.1	......
29	4.8	......	4.8	......	......	......	5.0	......	......	......	9.3	......
30	4.7	......	4.7	......	......	......	......	......	......	......	8.9	......
31	4.8	......	4.8	......	......	......	......	......	......	......	8.1	......

Daily gage height, in feet, and discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1912—Continued.

Day.	April.				May.				June.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	......	......	5.8	1,210	5.2	775	5.1	710	8.7	4,600	8.3	4,050
2	......	......	5.9	1,300	5.1	710	5.0	650	7.4	2,900	7.2	2,660
3	......	......	6.3	1,660	4.9	590	4.95	620	7.0	2,420	6.6	1,970
4	......	......	6.3	1,660	5.0	650	5.05	680	6.3	1,660	6.3	1,660
5	......	......	7.4	2,900	5.0	650	5.0	650	6.0	1,380	6.1	1,470
6	......	......	7.9	3,530	5.2	775	6.0	1,380	6.2	1,560	5.8	1,210
7	......	......	14.4	15,000	5.8	1,210	5.3	840	5.4	910	5.5	980
8	11.9	9,500	9.9	6,340	5.2	775	5.1	710	5.3	840	5.35	875
9	9.0	5,020	8.4	4,180	5.0	650	5.05	680	5.2	775	5.1	710
10	7.3	2,780	7.7	3,270	5.1	710	5.0	650	5.3	840	5.2	775
11	7.3	2,780	7.5	3,020	5.0	650	4.8	535	5.3	840	5.3	840
12	7.1	2,540	7.7	3,270	4.8	535	4.7	480	5.2	775	5.1	710
13	7.6	3,140	7.1	2,540	4.8	535	4.8	535	5.1	710	5.1	710
14	7.5	3,020	7.6	3,140	6.6	1,970	6.1	1,470	5.0	650	4.8	535
15	7.7	3,270	8.6	4,460	5.4	910	5.4	910	4.8	535	4.7	480
16	9.9	6,340	10.9	7,900	5.6	1,060	5.2	775	4.7	480	4.75	508
17	10.0	6,490	9.3	5,440	7.5	3,020	7.2	2,660	4.6	430	4.55	406
18	8.8	4,050	8.5	4,320	6.2	1,560	6.0	1,380	4.55	406	4.5	381
19	8.2	3,920	8.0	3,660	5.6	1,060	5.4	910	4.5	381	4.5	381
20	8.1	3,790	7.5	3,020	5.3	840	5.4	910	4.4	334	4.5	381
21	7.5	3,020	7.2	2,660	9.3	5,440	8.7	4,600	4.6	430	4.4	334
22	7.1	2,540	6.8	2,190	8.4	4,180	7.8	3,400	4.4	334	4.4	334
23	8.6	4,460	7.6	3,140	7.4	2,900	7.4	2,900	4.4	334	4.4	334
24	7.1	2,540	7.2	2,660	6.8	2,190	6.6	1,970	4.4	334	4.4	334
25	6.7	2,080	6.4	1,760	6.4	1,760	6.3	1,660	4.5	381	4.4	334
26	6.3	1,660	6.35	1,710	6.2	1,560	5.8	1,210	4.45	358	4.4	334
27	6.2	1,560	6.0	1,380	5.6	1,060	5.6	1,060	4.3	289	4.3	289
28	5.9	1,300	5.8	1,210	5.4	910	5.3	840	4.3	289	4.2	246
29	5.7	1,130	5.7	1,130	5.5	980	6.7	2,080	4.2	246	4.2	246
30	5.5	980	5.3	840	9.6	5,890	9.8	6,190	4.25	268	4.25	268
31	......	......	......	......	9.8	6,190	10.1	6,640	4.2	246	4.2	246

Daily gage height, in feet, and discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1912—Continued.

Day.	July.				August.				September.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	4.2	246	4.2	246	4.3	289	4.2	246	4.0	168	4.1	206
2	4.1	206	4.2	246	4.2	246	4.2	246	3.9	132	4.2	246
3	4.0	168	4.0	168	4.2	246	4.3	289	4.6	430	4.4	334
4	3.9	132	3.8	100	4.3	289	4.5	381	4.25	268	4.2	246
5	3.8	100	3.65	62	4.3	289	4.3	289	4.3	289	4.2	246
6	3.6	51	3.5	33	4.3	289	4.3	289	4.35	312	4.4	334
7	3.5	33	3.5	33	4.3	289	4.3	289	4.4	334	4.45	355
8	3.45	26	3.4	19	4.3	289	4.3	289	4.0	168	4.0	168
9	3.5	33	3.6	51	4.3	289	4.3	289	4.2	246	4.25	268
10	3.6	51	3.6	51	4.3	289	4.4	334	4.1	206	4.1	206
11	4.0	168	4.1	206	4.5	381	4.5	381	4.2	246	4.2	246
12	4.4	334	4.3	289	4.5	381	4.6	430	4.2	246	4.4	334
13	4.3	289	4.2	246	4.3	289	4.25	268	4.15	226	4.15	226
14	4.3	289	4.2	246	4.1	206	4.1	206	4.15	226	4.2	246
15	4.3	289	4.3	289	4.0	168	4.1	206	4.7	480	5.0	650
16	4.2	246	4.3	289	4.1	206	4.15	226	4.8	535	4.9	590
17	4.2	246	4.2	246	4.1	206	4.2	246	4.9	590	4.7	480
18	4.2	246	4.15	226	4.3	289	4.3	289	4.8	535	4.8	535
19	4.1	206	4.1	206	4.1	206	4.0	168	4.75	508	4.8	535
20	4.0	168	3.9	132	4.0	168	4.0	168	4.9	590	5.6	1,060
21	3.6	51	4.0	168	4.1	206	4.1	206	5.5	980	5.3	840
22	4.7	480	4.2	246	4.1	206	4.1	206	5.0	650	4.8	535
23	4.5	381	4.3	289	3.8	100	3.9	132	4.6	430	4.5	381
24	4.3	289	4.3	289	3.7	73	3.6	51	4.6	430	4.5	381
25	4.2	246	4.1	206	3.6	51	3.6	51	4.5	381	4.5	381
26	3.9	132	3.65	62	4.1	206	4.05	187	4.5	381	4.4	334
27	4.0	168	4.0	168	4.0	168	4.0	168	4.4	334	4.35	312
28	4.05	187	4.0	168	4.05	187	4.0	168	4.4	334	4.5	381
29	4.0	168	4.0	168	4.0	168	4.0	168	5.4	910	5.4	910
30	4.1	206	4.2	246	4.1	206	4.1	206	4.9	590	4.75	508
31	4.2	246	4.3	289	3.9	132	3.9	132	......	......	......	......

Daily gage height, in feet, and discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1912—Continued.

Day.	October.				November.				December.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	4.7	480	4.7	480	4.7	480	4.7	480	4.8	535	4.8	535
2	4.65	455	4.5	381	4.7	480	4.8	535	4.7	480	4.7	480
3	4.4	334	4.4	334	4.6	430	4.65	455	5.0	650	4.8	535
4	4.25	268	4.1	206	4.6	430	4.6	430	4.8	535	4.8	535
5	4.2	246	4.0	168	4.6	430	4.5	381	5.3	840	5.4	910
6	3.9	132	3.8	100	4.6	430	4.7	480	5.2	775	5.0	650
7	4.3	289	4.3	289	4.6	430	4.6	430	5.0	650	4.8	535
8	4.3	289	4.3	289	7.0	2,420	6.8	2,190	4.8	535	4.8	535
9	4.3	289	4.2	246	6.2	1,560	6.0	1,380	4.8	535	4.9	590
10	4.3	289	4.3	289	5.4	910	5.3	840	4.8	535	4.8	535
11	4.1	206	4.2	246	5.0	650	5.1	710	4.7	480	4.8	535
12	4.1	206	4.1	206	5.4	910	5.4	910	4.8	535	4.8	535
13	4.7	480	4.5	381	5.2	775	5.0	650	4.8	535	4.7	480
14	4.4	334	4.4	834	7.0	2,420	6.9	2,300	4.7	480	4.8	535
15	4.4	334	4.6	430	6.3	1,660	6.0	1,380	4.8	535	4.8	535
16	4.4	334	4.4	334	5.4	910	5.3	840	4.6	430	4.65	455
17	4.35	312	4.3	289	5.3	840	5.3	840	4.6	430	4.7	480
18	4.25	268	4.25	268	5.2	775	5.0	650	4.7	480	4.7	480
19	4.0	168	3.9	132	4.8	535	4.8	535	5.0	650	5.3	840
20	3.9	132	3.9	132	4.8	535	4.8	535	5.1	710	4.8	535
21	4.3	289	4.3	289	4.7	480	4.8	535	4.8	535	4.6	430
22	4.15	226	4.1	206	4.8	535	4.8	535	4.35	312	4.3	289
23	4.0	168	4.4	334	4.8	535	4.8	535	4.3	289	4.3	289
24	10.2	6,790	8.8	4,740	4.8	535	4.9	590	4.3	289	4.3	289
25	8.0	3,660	7.3	2,780	4.8	535	4.8	535	4.4	334	4.4	334
26	6.3	1,660	6.0	1,380	4.8	535	4.8	535	4.4	334	4.35	312
27	5.5	980	5.3	840	4.9	590	4.8	535	4.4	334	4.55	406
28	5.0	650	5.1	710	4.8	535	4.8	535	4.5	381	4.5	381
29	4.7	480	4.7	480	4.8	535	4.8	535	4.5	381	4.45	358
30	4.7	480	4.9	590	4.7	480	4.75	508	4.5	381	4.5	381
31	4.7	480	4.7	480	......	......	......	......	5.1	710	5.2	775

NOTE.—Relation of gage height to discharge affected by ice from first part of January until the latter part of March; from the beginning of the period, ice forming rapidly until 30 inches thick, gage heights were read to water surface. Readings were taken at 8.30 a. m. and 4.30 p. m. Daily discharge determined from a rating curve well defined below 8,000 second-feet.

WORCESTER BRANCH OF WINOOSKI RIVER AT MONTPELIER, VT.

Location.—At Montpelier, a short distance below the plant of the Lane Manufacturing Co., near the junction of Worcester Branch with the main stream.

Records available.—May 15, 1909, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff, fastened to a stone wall and tree about 100 feet below the plant; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from a steel highway bridge about 300 feet below the gage.

Winter flow.—Relation between gage height and discharge during the winter months is materially affected by ice.

Accuracy.—Diurnal fluctuation of discharge, caused by artificial control of the stream above this station, makes the computation of the mean daily flow, based on two observations, inaccurate, but as a good rating curve has been developed it is considered advisable to publish the gage reader's observations together with the rate of flow corresponding to each.

Discharge measurements of Worcester Branch of Winooski River at Montpelier, Vt., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 20[a]	G. H. Canfield	1.59	30.6
Sept. 4[b]	J. G. Mathers	1.45	69.9
Oct. 12[b]	C. S. De Golyer	1.11	22.7
13[b]	.....do	2.79	329
14[b]	.....do	1.95	131

[a] Made under complete ice cover of first bridge below gage.
[b] Made by wading near the gage.

Daily gage height, in feet, and discharge, in second-feet, of Worcester Branch of Winooski River at Montpelier, Vt., for 1912.

[S. A. Luke, observer.]

Day.	February.				March.			
	A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1					1.5	66		
2					1.4	54		
3							1.4	54
4					1.5	66		
5					1.6	79		
6					1.6	79		
7					1.7	94		
8					1.7	94		
9					1.6	79		
10							1.7	94
11					1.7	94		
12					1.65	86		
13					1.7	94		
14					1.7	94		
15					1.8	110		
16					1.9	127		
17							2.4	234
18					2.5	258		
19					2.7	309		
20					2.8	335		
21	1.5	66			2.7	309		
22	1.55	72			2.4	234		
23	1.6	79			2.3	210		
24	1.5	66					1.7	94
25					1.8	110		
26	1.5	66			1.7	94		
27	1.4	54			1.5	66		
28	1.45	60			1.6	79		
29	1.5	66			2.9	362		
30					4.7	954		
31							3.9	666

Daily gage height, in feet, and discharge, in second-feet, of Worcester Branch of Winooski River at Montpelier, Vt., for 1912—Continued.

Day.	April.				May.				June.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	4.4	842	3.8	632	2.0	145	2.0	145	5.4	1,230	4.1	734
2	3.2	447	3.0	390	1.9	127	1.9	127	3.0	390	2.8	335
3	2.7	309	2.6	283	1.8	110	1.7	94	2.8	335	3.2	447
4	2.4	234	2.3	210	1.8	110	1.8	110	2.8	335	2.5	258
5	2.0	145	2.7	309	......	......	1.6	79	2.4	234	2.2	187
6	4.0	700	4.5	878	1.8	110	2.9	362	2.1	165	2.0	145
7	5.7	1,350	10.0	3,540	2.4	234	2.1	165	2.3	210	2.1	165
8	10.0	3,540	6.0	1,480	2.05	155	1.9	127	2.0	145	1.9	127
9	4.0	700	3.8	632	1.85	118	1.8	110	2.0	145	1.7	94
10	3.2	447	3.9	666	1.8	110	1.8	110	1.6	79	1.7	94
11	2.8	335	3.2	447	1.7	94	1.7	94	1.4	54	1.8	110
12	3.2	447	4.0	700	......	......	1.6	79	1.3	43	1.5	66
13	3.4	506	4.0	700	1.6	79	1.7	94	1.4	54	1.6	79
14	3.5	536	......	......	2.7	309	2.2	187	1.4	54	1.6	79
15	3.5	536	4.5	878	2.0	145	1.9	127	1.3	43	1.5	66
16	4.5	878	7.5	2,180	1.7	94	2.0	145	......	......	1.5	66
17	5.8	1,400	4.7	954	3.6	568	3.5	536	1.5	66	1.4	54
18	4.0	700	4.5	878	3.3	476	2.8	335	1.3	43	1.5	66
19	4.0	700	4.2	770	......	......	2.4	234	1.3	43	1.4	54
20	3.6	568	3.2	447	2.1	165	2.4	234	1.2	34	1.4	54
21	......	......	3.3	476	6.1	1,530	5.0	1,070	1.2	34	1.3	43
22	3.2	447	3.1	418	3.9	666	3.2	447	1.2	34	1.3	43
23	5.5	1,270	4.3	806	3.9	666	3.1	418	......	......	1.2	34
24	3.3	476	3.0	390	2.8	335	2.6	283	1.1	25	1.2	34
25	2.9	362	2.8	335	2.7	309	2.8	335	1.1	25	1.3	43
26	2.8	335	2.6	283	......	......	2.3	210	1.0	17	1.25	38
27	2.6	283	2.8	335	2.1	165	2.0	145	.9	10	1.3	43
28	2.6	283	2.4	224	1.9	127	1.8	110	1.0	17	1.4	54
29	2.3	210	1.9	127	1.8	110	2.4	234	1.0	17	1.0	17
30	2.0	145	1.9	127	4.6	916	4.4	842	......	......	1.0	17
31	......	......	......	......	5.0	1,070	4.9	1,030	......	......	......	......

Daily gage height, in feet, and discharge, in second-feet, of Worcester Branch of Winooski River at Montpelier, Vt., for 1912—Continued.

Day.	July.				August.				September.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	1.0	17	1.2	34	1.0	17	1.4	54	......	......	1.2	34
2	1.0	17	1.0	17	.6	1	1.3	43	1.1	25	1.3	43
3	.8	5	1.3	43	.7	3	1.2	34	1.5	66	1.5	66
4	.9	10	.8	5	......	......	1.0	17	1.3	43	1.5	66
5	.9	10	1.2	34	1.1	25	1.3	43	1.2	34	1.4	54
6	.7	3	1.3	43	1.2	34	1.4	54	1.15	30	1.3	43
7	......	......	.6	1	1.1	25	1.3	43	1.2	34	1.3	43
8	.7	3	1.0	17	1.1	25	1.3	43	......	......	1.1	25
9	.6	1	.5	0	1.0	17	1.3	43	1.15	30	1.3	43
10	.4	0	.5	0	1.1	25	1.0	17	1.1	25	1.2	34
11	.4	0	1.2	34	1.1	25	1.1	25	1.1	25	1.3	43
12	.5	0	1.3	43	1.1	25	1.3	43	1.1	25	1.4	54
13	.4	0	.4	0	1.2	34	1.3	43	1.1	25	1.2	34
14	......	......	.6	1	1.2	34	1.3	43	1.1	25	1.2	34
15	.7	3	1.1	25	1.2	34	1.5	66	......	......	2.0	145
16	.4	0	1.2	34	1.2	34	1.4	54	3.0	390	2.4	234
17	.6	1	1.4	54	1.0	17	1.0	17	1.7	94	1.9	127
18	.7	3	1.4	54	......	......	1.0	17	1.3	43	1.5	66
19	1.0	17	1.3	43	1.0	17	1.1	25	2.7	309	2.5	258
20	.6	1	.7	3	.9	10	1.1	25	2.5	258	2.2	187
21	......	......	.9	10	.8	5	1.1	25	2.2	187	2.0	145
22	1.3	43	1.3	43	1.0	17	1.1	25	......	......	1.9	127
23	1.2	34	1.4	54	.8	5	1.0	17	1.4	54	1.6	79
24	1.2	34	1.4	54	.9	10	1.0	17	1.3	43	1.5	66
25	1.1	25	1.3	43	......	......	1.0	17	1.3	43	1.5	66
26	.9	10	1.3	43	1.0	17	1.3	43	1.2	34	1.45	60
27	.8	5	.9	10	2.2	187	2.0	145	1.2	34	1.5	66
28	......	......	1.0	17	1.4	54	1.3	43	1.35	48	1.5	66
29	.8	5	1.2	34	1.1	25	1.5	66	......	......	1.2	34
30	.7	3	1.3	43	1.1	25	1.3	43	1.7	94	1.8	110
31	.7	3	1.4	54	1.1	25	1.3	43	......	......	......	......

Daily gage height, in feet, and discharge, in second-feet, of Worcester Branch of Winooski River at Montpelier, Vt., for 1912—Continued.

Day.	October.				November.				December.			
	A. M.		P. M.		A. M.		P. M.		A. M.		P. M.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	1.7	94	1.5	66	1.5	66	1.6	79	......	......	1.5	66
2	1.2	34	1.5	66	1.9	127	2.1	25	1.3	43	1.5	66
3	1.2	34	1.5	66	......	......	1.8	110	3.7	600	2.9	362
4	1.2	34	1.3	43	1.5	66	1.5	66	3.5	536	2.8	335
5	......	......	1.1	25	1.6	79	1.5	66	2.1	165	2.0	145
6	1.1	25	1.4	54	1.5	66	1.6	79	2.5	258	2.9	362
7	1.1	25	1.3	43	1.5	66	1.9	127	2.7	309	2.5	258
8	1.2	34	1.3	43	5.8	1,400	3.9	666	......	......	2.0	145
9	1.2	34	1.25	38	3.1	418	2.7	309	1.7	94	1.8	110
10	1.2	34	1.2	34	......	......	2.6	283	1.7	94	1.9	127
11	1.1	25	1.4	54	2.6	283	2.3	210	1.7	94	1.6	79
12	1.1	25	1.2	34	1.9	127	1.7	94	1.6	79	1.6	79
13	2.8	335	......	......	1.9	127	2.0	145	1.3	43	1.3	43
14	1.8	110	1.9	127	2.6	283	2.8	335	1.35	48	1.5	66
15	1.8	110	2.0	145	3.1	418	2.8	335	......	......	1.5	66
16	1.7	94	1.9	127	2.5	258	2.3	210	1.5	66	1.5	66
17	1.4	54	1.5	66	......	......	2.1	165	1.3	43	1.45	60
18	1.3	43	1.5	66	2.0	145	1.8	110	1.3	43	1.5	66
19	1.2	34	1.4	54	1.9	127	1.8	110	1.5	66	2.7	309
20	......	......	1.3	43	1.8	110	1.7	94	2.6	283	2.2	187
21	1.3	43	1.3	43	1.7	94	1.7	94	1.5	66	1.6	79
22	1.2	34	1.3	43	1.9	127	1.9	127	......	......	1.4	54
23	1.1	25	1.5	66	1.7	94	1.8	110	1.5	66	1.5	66
24	8.5	2,680	4.5	878	......	......	1.6	79	1.5	66	1.45	60
25	5.1	1,110	3.9	666	1.7	94	1.8	110	......	......	1.4	54
26	3.1	418	2.9	362	1.7	94	1.7	94	1.4	54	1.4	54
27	......	......	2.5	258	1.6	79	1.6	79	1.35	48	1.4	54
28	2.2	187	2.1	165	1.5	66	1.5	66	1.3	43	1.4	54
29	1.9	127	1.9	127	1.4	54	1.5	66	......	......	1.3	43
30	1.8	110	1.8	110	1.4	54	1.5	66	1.2	34	1.4	54
31	1.6	79	1.6	79	......	......	......	......	1.6	79	1.5	66

NOTE.—Gage heights read about 6.50 a. m. and 4.30 p. m. Daily discharge determined from a well-defined rating curve.

DOG RIVER AT NORTHFIELD, VT.

Location.—At the highway bridge in Northfield, Vt., near the Norwich University grounds. Union Brook flows into Dog River a short distance below this station.

Records available.—May 14, 1909, to December 14, 1912. Records from May 14, 1909, to August 23, 1910, from lower bridge. Records from August 23, 1910, to December 31, 1912, at present location.

Drainage area.—57 square miles.

Gage.—Vertical staff, attached to highway bridge.

Datum.—Unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from highway bridge at high stages and by wading at low stages.

Winter flow.—Relation between gage height and discharge during the winter months is seriously affected by ice.

Accuracy.—The rating curve for this station is good. Diurnal fluctuation, due to power operations, exists to some extent, but it is not thought that it will materially affect computations based on semidaily observations.

Discharge measurements of Dog River at Northfield, Vt., in 1911–12.

Date.	Hydrographer.	Gage height.	Discharge.
1911.		*Feet.*	*Sec.-ft.*
June 19[a]	G. H. Canfield	1.00	12.0
1912.			
Sept. 13[b]	J. G. Mathers	1.28	29.0

[a] Made by wading 100 feet above the bridge. Through a typographical error this measurement was given incorrectly in Water Supply Paper 204.
[b] Made by wading 50 feet below the bridge.

Daily gage height, in feet, of Dog River at Northfield, Vt., for 1912.

[Florence Doyle, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.65			2.7	1.94	3.9	1.08	0.90	0.95	1.21	1.85	1.74
2	1.52			2.2	1.93	2.9	1.00	.92	1.30	1.28	1.95	1.70
3	1.52			2.0	1.81	2.9	1.04	1.12	1.14	1.18	1.82	2.9
4	1.60			1.86	1.75	2.65	.99	1.02	1.06	1.14	1.72	2.3
5	1.52			2.95	1.71	2.45	.94	.95	1.06	1.18	1.76	2.05
6	1.46			4.8	2.1	2.25	.86	1.02	1.08	1.10	1.71	2.5
7				6.1	2.05	2.3	1.01	.90	1.04	1.10	1.92	2.3
8				4.9	1.88	2.1	1.00	.92	1.00	1.06	3.5	2.1
9				3.4	1.86	1.86	.94	.90	.96	1.04	2.65	1.65
10				3.2	1.85	1.82	.92	.96	.92	1.10	2.35	1.58
11				3.0	1.72	1.92	1.06	1.01	1.05	1.09	2.2	1.52
12				3.2	1.66	1.84	1.00	1.10	1.08	1.15	2.1	1.58
13				3.4	1.72	1.79	.98	.94	.96	1.14	2.4	1.60
14				3.8	1.91	1.65	1.02	1.05	.98	1.06	2.4	1.58
15				4.0	1.68	1.52	1.00	1.02	.96	1.18	2.45	1.62
16			1.50	5.6	1.95	1.56	.92	.96	1.72	1.15	2.1	1.62
17			1.54	4.4	3.2	1.55	.88	.96	1.26	1.14	2.0	1.55
18			1.56	3.9	2.6	1.45	.90	.94	1.10	1.08	2.0	1.52
19			1.74	3.9	2.25	1.42	1.22	.99	1.14	1.07	1.90	2.1
20			2.1	3.2	2.3	1.37	1.00	.98	1.42	1.06	1.84	1.73
21			1.68	3.2	4.2	1.32	1.06	.90	1.95	1.10	1.80	1.50
22			1.66	3.0	3.1	1.29	1.44	.90	1.49	1.05	1.80	1.55
23			1.56	3.6	2.9	1.24	1.14	.94	1.32	1.58	1.76	1.48
24			1.51	2.9	2.6	1.20	.98	.92	1.28	5.2	1.72	1.40
25			1.44	2.85	2.35	1.18	.99	.92	1.22	3.4	1.80	1.35
26			1.35	2.7	2.2	1.19	.96	1.00	1.15	2.4	1.78	1.40
27			1.42	2.7	2.1	1.15	.92	1.26	1.24	2.25	1.74	1.40
28			1.52	2.4	1.88	1.11	.90	1.02	1.12	2.1	1.70	1.40
29			2.4	2.25	2.45	1.08	.90	.96	1.15	1.88	1.60	1.38
30			2.6	2.05	4.0	1.06	.90	.94	1.5	1.82	1.66	1.49
31			2.45		3.9		.94	.94		1.7		2.05

NOTE.—Relation of gage heights to discharge affected by ice Jan. 7 to Mar. 15.

Daily discharge, in second-feet, of Dog River at Northfield, Vt., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	192	92	419	17	8	10	25	82	71
2	....	123	91	223	12	9	31	30	94	67
3	....	99	78	223	14	19	20	23	79	223
4	....	84	72	184	12	13	16	20	69	136
5	....	231	68	156	10	10	16	23	73	105
6	....	682	111	130	6	13	17	18	68	163
7	....	1,320	105	136	13	8	14	18	90	136
8	....	718	86	111	12	9	12	16	332	111
9	....	312	84	84	10	8	10	14	184	82
10	....	274	82	79	9	10	9	18	142	86
11	....	239	69	90	16	13	15	17	123	79
12	....	274	63	81	12	18	17	21	111	55
13	....	312	69	76	11	10	10	20	149	57
14	....	293	89	62	13	15	11	16	149	55
15	....	443	65	50	12	13	10	23	156	59
16	48	1,030	94	53	9	10	69	21	111	59
17	52	553	274	52	7	10	28	20	99	52
18	53	419	177	44	8	10	18	17	99	50
19	71	419	130	41	25	12	20	16	88	111
20	111	274	136	37	12	11	41	16	81	72
21	65	274	496	33	16	8	94	18	77	48
22	63	239	256	30	43	8	47	15	77	52
23	53	353	223	27	20	10	33	55	73	46
24	49	223	177	24	11	9	30	838	69	39
25	43	215	142	23	12	9	25	312	77	35
26	35	192	123	23	10	12	21	149	75	39
27	41	192	111	21	9	28	27	130	71	39
28	50	149	86	19	8	13	19	111	67	39
29	149	130	156	17	8	10	21	86	57	37
30	177	105	443	16	8	10	48	79	63	47
31	156	....	419	....	10	10	....	67	....	105

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Dog River at Northfield, Vt., for 1912.

[Drainage area, 57 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March 16-31	177	35	76.0	1.33	0.79	A.
April	1,320	84	345	6.05	6.75	A.
May	496	63	151	2.65	3.06	A.
June	419	16	85.5	1.50	1.67	A.
July	43	6	12.7	.223	.26	B.
August	28	8	11.5	.202	.23	B.
September	94	9	25.3	.444	.50	B.
October	838	14	72.6	1.27	1.46	A.
November	332	57	103	1.81	2.02	A.
December	223	35	76.0	1.33	1.53	A.

LAMOILLE RIVER AT JOHNSON, VT.

Location.—At the highway bridge in the town of Johnson on the main road from the railroad station to the post office, about 400 feet above the mouth of Gihon River.

Records available.—July 14, 1910, to December 31, 1912; from July 28, 1909, to July 13, 1910, a station was maintained on the Lamoille at Morrisville.

Drainage area.—Not measured.

Gage.—Chain, fastened to the hand rail of the bridge.

Channel.—Probably permanent; bed composed of gravel; ledge rock projects from the left bank; a small gravel riffle about 350 feet below the bridge will prevent backwater at the gage.

Discharge measurements.—At high stages made from footbridge; at low stages, by wading about 500 feet above the bridge.

Accuracy.—Diurnal fluctuation of discharge, caused by artificial control of the stream above this station, makes the computation of the mean daily flow, based on two observations, inaccurate, but as a good rating curve has been developed it is considered advisable to publish the gage reader's observations, together with the rate of flow corresponding to each.

Discharge measurements of Lamoille River at Johnson, Vt., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 24[a]	G. H. Canfield	3.70	155
Aug. 29	J. G. Mathers	2.57	206
Oct. 19	C. S. De Golyer	2.69	238

[a] Measurement made under complete ice cover at bridge.

Daily gage height, in feet, and discharge, in second-feet, of Lamoille River at Johnson, Vt., for 1912.

[F. M. Ward, observer.]

Day.	January.						February.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	7.00	3.05		12.00	3.15							
2	7.00	3.15		12.00	3.25							
3	7.00	3.35		12.00	3.25							
4	7.00	3.15		12.00	3.25							
5	7.00	3.15		12.00	3.25							
24										12.00	3.6	
25										12.00	3.45	
26										12.00	3.45	
27										12.00	3.45	

Day.	March.						April.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1							7.00	7.0		6.00	7.0	
2							7.00	6.4		6.00	6.3	
3							7.00	5.6		6.00	5.2	
4							7.00	5.0		6.00	5.1	
5							7.00	5.1		6.00	5.3	
6							7.00	8.3		5.00	10.3	
7							9.00	12.3		5.00	12.2	
8							7.00	16.0		6.00	11.3	
9							7.00	7.8	3,490	6.00	7.3	3,090
10				2.00	4.0		7.00	6.2	2,230	6.00	6.2	2,230
11				12.00	3.9		7.00	5.5	1,740	6.00	5.9	2,020
12				12.00	3.7		7.00	5.6	1,810	6.00	6.2	2,230
13				12.00	3.6		7.00	5.9	2,020	5.00	6.2	2,230
14				12.00	3.6		10.00	6.4	2,370	5.00	6.5	2,450
15				12.00	3.45		7.00	8.2	3,810	6.00	8.5	
16				12.00	3.7		7.00	10.3		6.00	11.6	
17				2.00	4.0		7.00	12.0		6.00	10.0	
18				12.00	4.6		7.00	8.3	3,890	6.00	7.8	3,490
19	7.00	5.8		6.00	4.7		7.00	8.3	3,890	6.00	7.2	3,010
20	7.00	5.0		6.00	5.2		7.00	7.2	3,010	5.00	6.5	2,450
21							10.00	7.0	2,850	5.00	6.8	2,690
22							7.00	5.2	1,530	6.00	6.0	2,090
23							7.00	9.8		6.00	9.7	
24							7.00	7.2	3,010	6.00	5.8	1,950
25							7.00	5.3	1,600	6.00	5.4	1,670
26							7.00	5.2	1,530	6.00	5.3	1,600
27							7.00	4.3	965	6.00	5.2	1,530
28							7.00	4.1	855	6.00	4.1	855
29				6.00	5.7		7.00	4.2	910	6.00	4.1	855
30				12.00	7.5		7.00	3.7	650	6.00	3.7	650
31				12.00	7.0							

Daily gage height, in feet, and discharge, in second-feet, of Lamoille River at Johnson, Vt., for 1912—Continued.

Day.	May.						June.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	7.00	4.0	800	6.00	4.3	965	7.00	8.8	....	5.00	7.6	3,330
2	7.00	3.8	700	6.00	3.45	532	8.00	7.3	3,090	5.00	7.0	2,850
3	7.00	3.7	650	5.00	3.35	488	7.00	5.0	1,400	6.00	5.6	1,810
4	7.00	3.25	445	5.00	3.15	405	7.00	4.7	1,200	6.00	4.9	1,330
5	9.00	3.45	532	5.00	3.35	488	7.00	5.3	1,600	6.00	4.8	1,260
6	7.00	3.05	365	6.00	3.6	600	7.00	4.3	965	6.00	4.1	855
7	7.00	3.7	650	6.00	3.6	600	7.00	4.2	910	6.00	4.3	965
8	7.00	3.35	488	6.00	3.4	510	7.00	4.0	800	6.00	4.4	1,020
9	7.00	3.3	465	6.00	3.3	465	7.00	3.8	700	5.00	3.45	532
10	7.00	3.3	465	6.00	3.4	510	7.00	3.25	445	6.00	3.3	465
11	7.00	3.25	445	5.00	3.15	405	7.00	3.25	445	6.00	3.45	532
12	8.00	3.15	405	5.00	3.25	445	7.00	3.25	445	6.00	3.35	488
13	7.00	3.25	445	6.00	3.45	532	7.00	3.35	488	6.00	3.45	532
14	7.00	4.5	1,080	6.00	4.7	1,200	7.00	3.25	445	6.00	3.15	405
15	7.00	4.0	800	6.00	3.7	650	7.00	3.05	365	5.00	2.95	328
16	7.00	4.3	965	6.00	4.4	1,020	8.00	2.95	328	5.00	3.05	365
17	7.00	4.8	1,260	6.00	5.9	2,020	7.00	3.35	488	6.00	3.25	445
18	7.00	5.6	1,810	5.00	4.9	1,330	7.00	3.15	405	6.00	3.05	365
19	9.00	4.6	1,140	5.00	4.4	1,020	7.00	2.95	328	6.00	2.75	258
20	7.00	3.7	650	6.00	3.9	750	7.00	2.85	292	6.00	2.65	227
21	7.00	6.6	2,530	6.00	7.0	2,850	7.00	2.65	227	6.00	2.65	227
22	7.00	5.9	2,020	6.00	4.8	1,260	7.00	2.75	258	5.00	2.65	227
23	7.00	5.4	1,670	6.00	5.3	1,600	8.00	2.65	227	5.00	2.55	199
24	7.00	4.5	1,080	6.00	4.6	1,140	7.00	2.35	151	6.00	2.45	174
25	7.00	4.8	1,260	5.00	4.6	1,140	7.00	2.55	199	6.00	2.45	174
26	7.00	4.4	1,020	5.00	4.0	800	7.00	2.4	162	6.00	2.6	212
27	7.00	3.9	750	6.00	3.6	600	7.00	2.6	212	6.00	2.6	212
28	7.00	3.35	488	6.00	3.25	445	7.00	2.5	186	6.00	2.4	162
29	7.00	3.15	405	6.00	3.7	650	7.00	2.35	151	5.00	2.4	162
30	7.00	4.0	800	6.00	4.3	965	8.00	2.35	151	5.00	2.25	130
31	7.00	7.0	2,850	6.00	7.6	3,330	......	......	......	......	......	......

Daily gage height, in feet, and discharge, in second-feet, of Lamoille River at Johnson, Vt., for 1912—Continued.

Day.	July.						August.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	7.00	2.25	130	6.00	2.35	151	7.00	2.25	130	6.00	2.3	140
2	7.00	2.25	130	6.00	2.35	151	7.00	2.25	130	6.00	2.35	151
3	7.00	2.15	109	6.00	2.3	140	7.00	2.45	174	5.00	2.75	258
4	7.00	2.25	130	6.00	2.15	109	8.00	2.55	199	5.00	2.35	151
5	7.00	2.2	119	6.00	2.1	99	7.00	2.4	162	6.00	2.6	212
6	7.00	1.95	73	5.00	2.05	90	7.00	2.4	162	6.00	2.45	174
7	7.00	1.95	73	5.00	1.95	73	7.00	2.35	151	6.00	2.3	140
8	7.00	2.05	90	6.00	2.15	109	7.00	2.3	140	6.00	2.35	151
9	7.00	1.95	73	6.00	2.05	90	7.00	2.4	162	6.00	2.3	140
10	7.00	2.0	81	6.00	2.2	119	7.00	2.4	162	5.00	2.4	162
11	7.00	2.15	109	6.00	2.2	119	7.00	2.25	130	5.00	2.35	151
12	7.00	2.15	109	6.00	2.2	119	7.00	2.45	174	6.00	2.75	258
13	7.00	2.1	99	6.00	2.25	130	7.00	2.45	174	6.00	2.45	174
14	7.00	2.05	90	5.00	1.95	73	7.00	2.45	174	6.00	2.35	151
15	7.00	2.1	99	6.00	2.3	140	7.00	2.5	186	6.00	2.4	162
16	7.00	2.05	90	6.00	2.25	130	7.00	2.35	151	6.00	2.3	140
17	7.00	2.1	99	6.00	2.25	130	7.00	2.35	151	5.00	2.25	130
18	7.00	2.15	109	6.00	2.25	130	8.00	2.25	130	5.00	2.25	130
19	7.00	2.1	99	6.00	2.2	119	7.00	2.15	109	6.00	2.05	90
20	7.00	2.1	99	6.00	2.35	151	7.00	2.3	140	6.00	2.35	151
21	7.00	2.25	130	5.00	2.25	130	7.00	2.25	130	6.00	2.2	119
22	7.00	2.15	109	6.00	2.25	130	7.00	2.23	125	6.00	2.25	130
23	7.00	2.15	109	6.00	2.35	151	7.00	2.25	130	6.00	2.25	130
24	7.00	2.05	90	6.00	2.25	130	7.00	2.35	151	6.00	2.3	140
25	7.00	2.1	99	6.00	2.3	140	7.00	2.5	186	5.00	2.6	212
26	7.00	2.1	99	6.00	2.15	109	7.00	2.65	227	6.00	2.55	199
27	7.00	2.1	99	5.00	2.2	119	7.00	2.9	310	6.00	3.35	488
28	8.00	2.15	109	5.00	2.25	130	7.00	2.9	310	6.00	2.95	328
29	7.00	2.1	99	6.00	2.3	140	7.00	2.6	212	6.00	2.4	162
30	7.00	2.4	162	6.00	2.4	162	7.00	2.5	186	6.00	2.4	162
31	7.00	2.25	130	6.00	2.3	140	7.00	2.4	162	5.00	2.35	151

Daily gage height, in feet, and discharge, in second-feet, of Lamoille River at Johnson, Vt., for 1912—Continued.

Day.	September.						October.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	8.00	2.4	162	5.00	2.3	140	7.00	2.8	275	1.00	2.9	[illegible]
2	7.00	2.25	130	6.00	2.35	151	7.00	2.95	328	1.00	2.95	[illegible]
3	7.00	2.35	151	6.00	2.3	140	7.00	2.8	275	1.00	2.7	[illegible]
4	7.00	2.4	162	6.00	2.4	162	7.00	2.75	258	1.00	2.7	[illegible]
5	7.00	2.4	162	6.00	2.4	162	7.00	2.7	242	5.00	2.65	[illegible]
6	7.00	2.7	242	6.00	2.7	242	8.00	2.5	186	5.00	2.5	[illegible]
7	7.00	2.6	212	5.00	2.7	242	7.00	2.3	140	1.00	2.4	162
8	7.00	2.3	140	6.00	2.4	162	7.00	2.5	186	1.00	2.6	212
9	7.00	2.2	119	6.00	2.3	140	7.00	2.55	199	1.00	2.6	212
10	7.00	2.3	140	6.00	2.2	119	7.00	2.55	199	1.00	2.55	199
11	7.00	2.4	162	6.00	3.0	345	7.00	2.6	212	1.00	2.7	242
12	7.00	2.9	310	6.00	2.75	258	7.00	2.6	212	5.00	2.8	275
13	7.00	2.6	212	6.00	2.5	186	7.00	2.9	310	5.00	3.0	345
14	7.00	2.5	186	5.00	2.3	140	7.00	3.1	385	1.00	3.2	425
15	8.00	2.3	140	5.00	2.4	162	7.00	2.8	275	1.00	2.85	[illegible]
16	7.00	3.2	425	6.00	3.4	510	7.00	2.8	275	1.00	2.9	310
17	7.00	2.95	328	6.00	2.7	242	7.00	2.8	275	1.00	2.7	242
18	7.00	2.8	275	6.00	2.9	310	7.00	2.8	275	1.00	2.7	242
19	7.00	4.1	855	6.00	3.9	750	7.00	2.7	242	1.00	2.7	242
20	7.00	4.3	965	6.00	4.2	910	8.00	2.6	212	5.00	2.6	212
21	7.00	4.0	800	5.00	3.9	750	7.00	2.3	140	1.00	2.45	174
22	8.00	3.4	510	5.00	3.4	510	7.00	2.65	227	1.00	2.62	[illegible]
23	7.00	2.9	310	6.00	3.0	345	7.00	2.7	242	1.00	2.6	212
24	7.00	2.9	310	6.00	3.0	345	7.00	11.0	....	1.00	10.6	....
25	7.00	2.7	242	6.00	2.75	258	7.00	8.2	3,810	1.00	8.0	[illegible]
26	7.00	2.6	212	6.00	2.6	212	7.00	6.4	2,370	1.00	6.2	[illegible]
27	7.00	2.6	212	6.00	2.5	186	8.00	6.0	2,090	1.00	5.9	[illegible]
28	7.00	2.55	199	5.00	2.4	162	7.00	3.6	600	1.00	3.8	700
29	8.00	2.4	162	5.00	2.7	242	7.00	3.7	650	1.00	3.6	600
30	7.00	2.9	310	6.00	3.1	385	7.00	2.7	242	1.00	3.2	425
31	......	......	......	......	......	......	7.00	3.2	425	1.00	3.1	[illegible]

Daily gage height, in feet, and discharge, in second-feet, of Lamoille River at Johnson, Vt., for 1912—Continued.

Day.	November.						December.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	7.00	3.1	385	1.00	3.2	425	8.00	3.3	465	4.00	3.0	345
2	7.00	3.2	425	1.00	3.6	600	7.00	2.7	242	1.00	2.8	275
3	8.00	3.4	510	1.00	3.3	465	7.00	5.3	1,600	1.00	5.0	1,400
4	7.00	3.1	385	1.00	3.2	425	7.00	4.1	855	1.00	4.2	910
5	7.00	3.0	345	1.00	3.1	385	7.00	3.8	700	1.00	3.8	700
6	7.00	2.9	310	1.00	3.1	385	7.00	3.7	650	1.00	4.2	910
7	7.00	3.0	345	1.00	3.1	385	7.00	4.3	965	1.00	4.4	1,020
8	7.00	8.3	3,890	1.00	8.0	3,650	8.00	4.0	800	3.00	3.4	510
9	7.00	5.6	1,810	1.00	5.1	1,460	7.00	3.1	385	1.00	3.2	425
10	8.00	5.0	1,400	4.00	4.7	1,200	7.00	3.0	345	1.00	3.2	425
11	7.00	3.7	650	1.00	3.6	600	7.00	3.0	345	1.00	3.3	465
12	7.00	3.5	555	1.00	4.3	965	7.00	3.1	385	1.00	3.2	425
13	7.00	3.3	465	1.00	3.2	425	7.00	3.0	345	1.00	3.0	345
14	7.00	3.9	750	1.00	5.1	1,460	7.00	3.0	345	1.00	3.15	405
15	7.00	4.9	1,330	1.00	5.1	1,460	8.00	3.1	385	3.00	2.9	310
16	7.00	4.5	1,080	1.00	4.6	1,140	7.00	3.0	345	1.00	3.1	385
17	8.00	4.3	965	4.00	4.5	1,080	7.00	3.0	345	1.00	3.4	510
18	7.00	4.0	800	1.00	4.1	855	7.00	3.1	385	1.00	3.2	425
19	7.00	3.2	425	1.00	3.4	510	7.00	3.0	345	1.00	4.1	855
20	7.00	3.3	465	1.00	3.4	510	7.00	4.0	800	1.00	4.1	855
21	7.00	3.4	510	1.00	4.3	965	7.00	3.5	555	1.00	3.6	600
22	7.00	2.6	212	1.00	2.7	242	8.00	3.9	750	4.00	3.7	650
23	7.00	2.35	151	1.00	3.3	465	7.00	3.3	465	1.00	3.4	510
24	7.00	3.0	345	5.00	3.2	425	7.00	3.4	510	1.00	3.5	555
25	7.00	3.1	385	1.00	3.2	425	7.00	3.5	555	1.00	3.6	600
26	7.00	3.4	510	1.00	3.5	555	7.00	3.0	345	1.00	3.1	385
27	7.00	3.2	425	1.00	3.25	445	7.00	3.1	385	1.00	3.2	425
28	7.00	3.1	385	3.00	3.2	425	7.00	3.2	425	1.00	3.0	345
29	7.00	2.85	292	1.00	2.8	275	8.00	3.3	465	4.00	3.1	385
30	7.00	3.1	385	1.00	3.0	345	7.00	3.0	345	1.00	3.1	385
31							7.00	3.2	425	1.00	3.3	465

NOTE.—Discharge determined from a rating curve well defined below 5,000 second-feet.

MISSISQUOI RIVER NEAR RICHFORD, VT.

Location.—At the highway bridge 200 feet below the Central Vermont Railroad bridge, 3 miles downstream from Richford, about 3 miles below the mouth of North Branch and 2 miles above the mouth of Trout River.

Records available.—May 29, 1909, to December 31, 1912.

Drainage area.—300 square miles.

Gage.—Chain, fastened to the downstream side of the bridge; installed June 26, 1911. From May 29, 1909, to December 31, 1910, the gage was just below the plant of the Sweat, Comings Co.; this site was found unsatisfactory because of the great daily fluctuation caused by the operation of the turbines.

Channel.—Deep; banks not liable to be overflowed; bed composed of gravel, bowlders, and rock ledge; current sluggish at low stages. A well-defined riffle about half a mile downstream protects the gage from backwater from the mills below.

Discharge measurements.—At high stages made from downstream side of bridge; at low stages by wading.

Accuracy.—Diurnal fluctuation of discharge, caused by artificial control of the stream above the station, makes the computation of the mean daily flow, based on two observations, inaccurate, but as a good rating curve has been developed it is considered advisable to publish the gage reader's observations, together with the rate of flow corresponding to each.

Discharge measurements of Missisquoi River near Richford, Vt., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 26[a]	G. H. Canfield	6.42	190
Aug. 27	J. G. Mathers	6.65	835
27	....do	6.58	790
Oct. 18	C. S. De Golyer	5.94	407
18	....do	5.81	340

[a] Made under complete ice cover.

Daily gage height, in feet, and discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1912.

[P. Sloan, observer.]

Day.	March.						April.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1												
2				2.00	6.5							
3							8.30	7.0				
4												
5							9.00	7.6				
6							9.00	8.7				
7	9.00	6.4					7.30	16.0		5.30	15.4	
8							6.30	18.2		6.00	16.2	
9										5.30	13.0	
10							7.00	11.4	4,960			
11										5.15	10.2	3,820
12	10.00	6.7					7.00	9.8	3,450			
13							7.00	9.0	2,730			
14										4.15	10.8	4,390
15										5.00	12.3	
16							7.30	13.0		5.30	14.1	
17							7.00	14.7		5.15	14.9	
18							9.30	13.8				
19	9.00	8.0					8.30	12.1	5,650	4.30	11.6	5,150
20							7.30	11.0	4,580			
21												
22							6.45	10.3	3,920	5.15	10.0	3,630
23	9.00	7.4					9.45	14.0		4.30	14.6	
24							8.00	13.8				
25							7.45	11.1	4,680			
26							8.00	9.3	3,000	6.30	8.8	2,550
27							7.00	8.3	2,120			
28												
29							8.15	7.7	1,620			
30										4.30	7.3	1,310
31												

Daily gage height, in feet, and discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1912—Continued.

Day.	May.						June.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	7.30	7.0	1,090	......	......	......	5.45	14.7	......	......	......	......
2	......	......	......	6.00	6.7	880	......	......	......	......	......	......
3	9.00	6.6	815	4.30	6.6	815	5.45	11.0	4,580	6.30	10.4	4,010
4	7.15	6.45	718	......	......	......	6.00	9.9	3,540	......	......	......
5	7.45	6.25	590	......	......	......	8.30	9.0	2,730	......	......	......
6	7.00	6.2	560	4.30	6.4	685	5.45	7.8	1,700	4.00	7.1	1,160
7	7.15	6.5	750	......	......	......	7.30	8.2	2,030	6.45	8.0	1,860
8	6.30	6.4	685	......	......	......	5.45	7.7	1,620	......	......	......
9	7.30	6.3	620	7.00	6.3	620	6.00	7.1	1,160	......	......	......
10	7.00	6.5	750	6.30	6.6	815	5.45	6.8	950	6.30	6.7	880
11	9.00	6.6	815	......	......	......	5.45	7.1	1,160	7.00	7.0	1,090
12	7.00	6.2	560	4.30	6.2	560	5.30	6.8	950	......	......	......
13	......	......	......	5.00	6.8	950	5.15	6.8	960	......	......	......
14	6.30	7.3	1,310	7.00	7.4	1,380	5.45	6.5	750	4.15	6.5	750
15	......	......	......	7.30	6.9	1,020	6.00	6.3	620	......	......	......
16	6.45	6.7	880	......	......	......	6.30	6.1	500	......	......	......
17	7.00	7.2	1,240	4.00	7.6	1,540	5.45	6.1	500	4.30	6.0	445
18	6.45	9.5	3,180	......	......	......	5.30	5.95	420	5.00	5.85	370
19	......	......	......	......	......	......	5.30	5.75	326	......	......	......
20	8.00	7.7	1,620	4.00	7.5	1,460	5.30	5.7	304	......	......	......
21	7.45	8.3	2,120	5.00	8.0	1,860	6.00	5.65	284	5.00	5.65	284
22	......	......	......	5.15	7.8	1,700	5.30	5.6	264	......	......	......
23	7.45	7.6	1,540	......	......	......	6.30	5.45	210	4.00	5.3	162
24	9.00	7.4	1,380	4.30	7.3	1,310	5.30	5.3	162	......	......	......
25	6.45	8.8	2,550	......	......	......	5.30	5.4	193	......	......	......
26	......	......	......	......	......	......	8.00	5.5	227	4.15	5.55	246
27	7.15	7.1	1,160	4.45	6.9	1,020	5.30	5.5	227	4.30	5.45	210
28	6.00	6.6	815	......	......	......	5.45	5.45	210	4.15	5.4	193
29	6.30	6.9	1,020	4.15	11.2	4,770	5.30	5.4	193	......	......	......
30	5.45	10.7	4,300	4.45	10.7	4,300	......	......	......	......	......	......
31	6.00	11.2	4,770	4.15	12.0	5,550	......	......	......	......	......	......

Daily gage height, in feet, and discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1912—Continued.

Day.	July.						August.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	5.15	5.1	108	4.30	5.0	84	5.45	4.8	45	5.15	4.85	54
2	5.30	4.6	18	4.15	4.5	9	5.30	4.8	45	5.30	4.8	45
3	5.30	4.7	30	4.15	4.8	45	6.30	4.9	63	......	......	......
4	5.30	5.0	84	......	......	......	6.30	5.2	134	......	......	......
5	5.30	4.9	63	4.00	4.95	74	5.45	5.25	148	4.30	5.3	162
6	5.45	4.9	63	......	......	......	5.30	5.25	148	4.15	5.15	121
7	6.00	5.0	84	4.30	4.9	63	5.45	5.05	96	5.00	5.0	84
8	5.30	4.9	63	4.15	4.9	63	5.30	4.9	63	......	......	......
9	5.30	4.8	45	4.30	4.8	45	5.30	4.85	54	4.15	4.85	54
10	5.15	4.8	45	4.30	4.8	45	5.45	4.9	63	......	......	......
11	5.30	4.85	54	4.15	5.0	84	......	......	......	......	......	......
12	5.30	5.1	108	......	......	......	5.30	5.15	121	4.30	5.6	264
13	5.30	5.0	84	......	......	......	5.45	6.1	500	4.15	6.0	445
14	......	......	......	......	......	......	5.30	5.8	347	4.30	5.8	347
15	5.30	4.9	63	4.45	4.85	54	5.45	5.65	284	4.45	5.6	264
16	5.30	4.85	54	4.30	4.8	45	5.45	5.45	210	7.00	5.4	193
17	5.30	4.8	45	......	......	......	5.45	5.4	193	......	......	......
18	5.30	4.75	38	4.30	4.65	24	......	......	......	......	......	......
19	5.30	4.7	30	4.15	4.7	30	5.45	5.1	108	4.30	5.0	84
20	5.45	4.8	45	......	......	......	5.30	5.0	84	5.00	5.0	84
21	6.30	4.75	38	......	......	......	5.30	5.0	84	5.15	4.9	63
22	5.30	4.9	63	4.15	5.0	84	5.30	4.95	74	5.15	4.9	63
23	5.30	4.9	63	......	......	......	6.00	4.9	63	4.00	4.85	54
24	5.45	4.8	45	5.00	4.8	45	6.00	4.8	45	......	......	......
25	5.30	4.75	38	......	......	......	......	......	......	6.30	7.9	1,780
26	5.30	4.8	45	4.30	4.75	38	5.45	7.6	1,540	4.00	7.5	1,465
27	5.45	4.8	45	......	......	......	......	......	......	......	......	......
28	......	......	......	......	......	......	6.00	6.6	815	4.45	6.4	680
29	7.30	4.8	45	4.45	4.85	54	6.00	6.25	590	......	......	......
30	5.45	4.85	54	5.00	4.8	45	......	......	......	4.30	6.0	445
31	5.30	4.8	45	......	......	......	5.45	5.9	394	......	......	......

Daily gage height, in feet, and discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1912—Continued.

Day.	September.						October.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1							6.45	7.6	1,540	3.30	7.5	1.460
2	6.15	5.6	264	4.30	5.6	264	6.45	7.4	1,380	3.30	7.3	1,310
3	6.00	5.4	193				6.30	6.9	1,020			
4	6.15	5.3	162	4.00	5.3	162	6.30	6.5	750	4.30	6.6	815
5							6.45	6.4	685			
6				6.30	6.2	560				4.00	6.1	500
7	6.30	6.45	718				6.30	6.0	445	4.15	6.0	445
8							6.45	6.1	500	4.30	6.05	472
9	6.15	6.6	815	4.30	6.4	685	7.30	5.95	420	4.30	5.9	394
10	6.00	6.1	500	4.30	6.1	500	6.30	5.95	420	4.30	5.95	420
11	6.00	7.8	1,700	4.00	8.4	2,200	6.30	6.0	445	4.30	6.0	445
12	6.30	8.1	1,940				6.30	6.1	500			
13	6.15	7.1	1,160	4.30	6.8	950						
14	6.00	6.5	750				6.30	6.6	815	4.30	6.4	685
15							6.30	6.2	560	4.30	6.2	560
16	6.30	7.3	1,310				6.45	6.1	500	4.15	6.0	445
17	6.00	6.7	880	4.30	6.5	750	6.30	6.0	445	5.00	6.0	445
18	8.30	6.3	620	5.00	6.8	950	6.30	5.9	394			
19	6.45	8.5	2,280	4.30	8.7	2,460	6.30	5.8	347			
20	6.30	10.6	4,200	3.45	9.5	3,180						
21	6.30	9.2	2,910				7.15	6.05	472	4.30	6.0	445
22							6.30	5.9	394	4.30	5.9	394
23	6.30	7.6	1,540	2.30	7.4	1,380	6.45	5.8	347			
24	6.45	7.2	1,240	4.00	7.0	1,090	6.45	8.5	2,280	4.15	9.6	3,270
25	6.45	6.8	950				6.45	10.6	4,200	4.00	10.8	4,390
26	6.30	6.5	750				6.30	9.7	3,360			
27	6.45	6.15	530	4.30	6.05	472						
28	6.45	6.0	445				6.30	8.2	2,030	4.30	7.9	1,780
29				4.00	6.6	815	7.45	7.6	1,540	3.30	7.2	1,240
30	6.45	7.8	1,700	4.30	7.9	1,780	7.30	6.9	1,020	4.30	6.8	950
31							7.45	6.6	815			

Daily gage height, in feet, and discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1912—Continued.

Day.	November.						December.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	8.30	6.5	750									
2	7.00	6.8	950				8.15	7.4	1,360			
3							7.00	9.5	3,180			
4	7.15	6.3	620	4.30	6.3	620	7.30	9.1	2,820			
5	7.30	6.2	560				7.00	7.8	1,700			
6	7.45	6.1	500	4.30	6.0	445	7.00	7.4	1,380			
7	8.00	6.1	500	4.30	8.1	1,940	7.00	8.0	1,860			
8	7.30	12.0	5,550	3.00	11.7	5,250						
9	7.30	11.0	4,580				8.45	6.6	815			
10							7.00	6.6	815			
11	7.15	8.2	2,030	4.00	7.9	1,780	7.30	7.7	1,620			
12	7.30	7.6	1,540	3.30	7.4	1,380	8.00	7.5	1,460			
13	7.30	7.2	1,240	4.00	7.3	1,310	6.30	7.4	1,380			
14	7.45	8.2	2,030	4.00	8.6	2,370	7.30	7.9	1,780			
15	8.45	9.4	3,090	4.00	9.2	2,910						
16	7.30	8.8	2,550				8.15	8.8	2,550			
17							7.45	8.6	2,370			
18	7.15	7.4	1,380	4.00	7.3	1,310	7.30	8.4	2,200			
19	7.30	7.1	1,160				7.15	9.0	2,730			
20	7.30	6.9	1,020				7.30	12.2	5,750			
21	7.45	7.2	1,240				8.30	9.6	3,270			
22	7.00	7.4	1,380									
23	7.00	7.1	1,160				7.45	10.0	3,630			
24							8.00	9.7	3,360			
25	7.45	6.7	880	2.15	6.9	1,020						
26				3.30	6.8	950						
27	8.30	6.6	815									
28	8.15	6.5	750									
29	7.30	6.25	590									
30	8.15	6.2	560									

NOTE.—Daily discharge determined from a fairly well-defined rating curve. All discharges above 1,500 second-feet depend on a single measurement.

CLYDE RIVER AT WEST DERBY, VT.

Location.—Just below plant of the Newport Electric Light Co., at West Derby, Vt.

Records available.—May 25, 1909, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff, in two sections; low section about 75 feet below the plant; high-water section nailed to a tree on the right bank 10 feet farther downstream; datum unchanged.

Channel.—Bed rough; fall of river rapid near and below the station.

Discharge measurements.—Made from highway bridge about half a mile below the gage.

Artificial control.—At West Derby are two dams, both operated under the same management; at the upper dam part of the water is used by a paper mill and the remainder is delivered to the water wheels at the electric plant through a steel penstock; the total operating head from this dam is about 108 feet. All the flow from the second dam is diverted to the wheels in the power house, giving a head of about 30 feet. Practically no water is stored at the upper dam, but a pond of considerable size may be made by building a dam above this point.

Accuracy.—Diurnal fluctuation of discharge, caused by artificial control of the stream above this station, makes the computation of the mean daily flow, based on two observations, inaccurate; but as a good rating curve has been developed it is considered advisable to publish the gage reader's observations, together with the rate of flow corresponding to each.

The following measurement was made by J. G. Mathers:

August 26, 1912: Gage height, 2.20 feet; discharge, 134 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of Clyde River at West Derby, Vt., for 1912.

[E. C. Rogers, observer.]

Day.	April.						May.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	8.30	2.50	228	5.30	2.50	228	7.35	3.3	790	6.45	3.2	690
2	7.00	2.53	241	6.00	2.58	263	8.10	3.2	690	6.55	3.15	645
3	8.15	2.62	282	5.45	2.58	263	7.45	3.05	558	6.35	3.05	558
4	9.30	2.68	312	6.15	2.55	250	7.20	3.05	558	5.15	3.0	516
5	8.50	2.60	272	4.15	2.62	282	8.40	3.0	516	6.15	3.0	516
6	8.00	2.60	272	5.50	2.85	410	6.40	3.0	516	6.45	2.95	479
7	8.00	3.0	516	4.30	3.45	940	7.30	2.95	479	6.50	2.90	442
8	10.30	3.65	1,160	5.00	3.65	1,160	7.55	2.9	442	6.30	2.88	429
9	8.00	3.7	1,210	5.20	3.75	1,260	8.50	2.88	429	7.00	2.88	429
10	7.45	3.7	1,210	4.15	3.7	1,210	7.20	2.88	429	4.50	2.88	429
11	8.50	3.6	1,100	5.15	3.5	990	7.30	2.82	391	4.40	2.82	391
12	6.20	3.5	990	5.30	3.4	890	8.15	2.80	378	6.00	2.80	378
13	8.20	3.4	890	6.00	3.4	890	8.40	2.80	378	5.50	2.78	367
14	7.30	3.35	840	5.30	3.35	840	7.45	2.82	391	5.30	2.82	391
15	7.45	3.4	890	5.00	3.5	990	8.45	2.85	410	7.00	2.88	429
16	7.30	3.55	1,040	6.25	3.7	1,210	8.00	2.90	442	6.45	2.92	457
17	8.20	3.9	1,430	3.20	4.0	1,540	6.50	2.98	501	7.00	3.0	516
18	7.35	4.2	1,760	3.50	4.25	1,820	6.30	2.92	457	7.00	2.90	442
19	9.20	4.2	1,760	3.30	4.15	1,700	8.15	2.92	457	5.00	2.90	442
20	8.10	4.0	1,540	6.20	3.9	1,430	8.20	2.88	429	5.25	2.88	429
21	7.40	3.8	1,320	4.20	3.7	1,210	7.45	2.92	457	6.45	2.92	457
22	8.10	3.65	1,160	5.20	3.6	1,100	6.15	2.90	442	6.30	2.88	429
23	7.45	3.65	1,160	5.20	3.65	1,160	8.45	2.90	442	6.30	2.90	442
24	7.45	3.7	1,210	6.40	3.85	1,380	7.30	2.85	410	6.35	2.88	429
25	6.20	3.8	1,320	6.15	3.85	1,380	8.00	2.90	442	4.50	2.88	429
26	7.30	3.7	1,210	6.50	3.65	1,160	8.15	2.85	410	6.50	2.85	410
27	8.35	3.6	1,100	6.20	3.5	990	7.50	2.82	391	6.15	2.75	350
28	7.10	3.5	990	6.45	3.4	890	7.30	2.75	350	6.45	2.70	322
29	7.15	3.4	890	5.10	3.4	890	7.00	2.72	333	6.45	2.80	378
30	6.40	3.35	840	7.00	3.3	790	7.10	2.88	429	6.15	2.92	457
31	......	......	......	......	......	......	8.20	3.0	516	6.25	3.15	645

Daily gage height, in feet, and discharge, in second-feet, of Clyde River at West Derby, Vt., for 1912—Continued.

Day.	June.						July.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	6.15	3.3	790	5.00	3.3	790	8.00	2.25	145	7.15	2.18	128
2	7.00	3.4	890	6.30	3.4	890	7.35	2.20	132	6.00	2.15	121
3	8.30	3.4	890	7.00	3.4	890	7.50	2.20	132	6.50	2.12	114
4	7.45	3.35	840	7.30	3.35	840	8.00	2.15	121	5.00	2.10	110
5	8.10	3.3	790	6.15	3.3	790	8.00	2.10	110	6.15	2.08	106
6	6.30	3.3	790	7.15	3.2	690	7.10	2.12	114	6.30	2.10	110
7	6.30	3.3	790	6.45	3.2	690	9.50	2.10	110	7.00	2.05	101
8	8.35	3.1	600	6.10	3.1	600	7.50	2.10	110	7.15	2.00	92
9	7.20	3.05	558	6.30	3.05	558	9.00	2.10	110	7.00	2.00	92
10	7.00	3.0	516	6.45	2.98	501	8.00	2.05	101	6.00	1.98	89
11	6.45	2.95	479	6.15	2.92	457	6.30	2.08	106	7.00	2.00	92
12	7.00	2.90	442	6.00	2.85	410	7.10	2.08	106	5.45	1.95	84
13	8.00	2.82	391	6.45	2.80	378	7.40	2.05	101	5.30	2.02	96
14	6.30	2.78	367	5.30	2.78	367	7.30	2.00	92	7.00	1.98	89
15	7.00	2.72	333	5.45	2.72	333	7.15	2.00	92	6.15	1.92	80
16	7.00	2.75	350	6.00	2.70	322	8.25	2.00	92	6.00	1.90	77
17	7.50	2.70	322	6.20	2.65	297	7.35	1.98	89	6.15	1.88	75
18	7.40	2.62	282	5.30	2.60	272	7.40	1.90	77	5.45	1.82	67
19	8.00	2.58	263	7.10	2.60	272	8.00	1.88	75	6.25	1.88	75
20	7.00	2.60	272	6.00	2.52	237	7.30	1.90	77	6.40	1.80	65
21	7.25	2.55	250	7.10	2.52	237	7.55	1.90	77	5.30	1.90	77
22	7.35	2.50	228	6.00	2.42	198	8.10	1.98	89	7.25	1.95	84
23	7.45	2.45	209	6.30	2.45	209	7.50	1.95	84	6.50	1.88	75
24	8.00	2.38	184	6.00	2.40	190	6.30	1.90	77	6.00	1.90	77
25	7.00	2.32	164	6.45	2.38	184	6.50	1.95	84	5.10	1.90	77
26	7.25	2.38	184	7.00	2.38	184	6.20	1.95	84	6.15	1.88	75
27	8.30	2.32	164	7.15	2.32	164	6.55	1.92	80	6.15	1.82	67
28	6.55	2.32	164	......	......	......	7.55	1.95	84	7.00	1.90	77
29	8.00	2.30	158	6.50	2.22	137	7.00	2.05	101	6.20	1.85	71
30	7.00	2.22	137	6.00	2.22	137	6.30	1.88	75	6.30	1.88	75
31	......	......	......	......	......	......	6.45	1.98	89	6.30	1.95	84

Daily gage height, in feet, and discharge, in second-feet, of Clyde River at West Derby, Vt., for 1912—Continued.

Day.	August.						September.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	6.50	1.92	80	6.00	1.90	77	7.00	2.30	158	5.00	2.30	158
2	7.10	1.88	75	6.00	1.95	84	6.30	2.32	164	6.25	2.30	158
3	8.00	1.95	84	6.10	1.92	80	6.35	2.30	158	5.20	2.25	145
4	8.00	2.00	92	4.00	1.98	89	6.55	2.18	128	5.50	2.20	132
5	5.30	1.98	89	5.45	1.98	89	7.05	2.18	128	5.30	2.12	114
6	6.30	1.98	89	6.15	1.90	77	7.00	2.12	114	5.45	2.10	110
7	5.30	1.98	89	5.45	1.98	89	7.15	2.12	114	4.30	2.18	128
8	6.45	2.05	101	6.15	1.98	89	7.00	2.18	128	5.45	2.15	121
9	6.15	2.05	101	6.30	2.02	96	6.20	2.18	128	5.30	2.12	114
10	7.50	2.02	96	5.30	2.00	92	7.15	2.18	128	5.20	2.15	121
11	7.45	2.00	92	6.40	2.00	92	8.30	2.32	164	4.00	2.25	145
12	6.30	2.18	128	6.15	2.15	121	8.50	2.30	158	5.30	2.25	145
13	7.55	2.18	128	6.00	2.12	114	7.40	2.12	114	5.10	2.20	132
14	6.00	2.20	132	5.45	2.20	132	7.15	2.28	153	5.15	2.25	145
15	7.00	2.18	128	5.15	2.15	121	6.45	2.18	128	5.00	2.20	132
16	7.50	2.20	132	6.30	2.20	132	6.50	2.32	164	5.15	2.20	132
17	6.45	2.18	128	6.45	2.18	128	7.10	2.22	137	5.30	2.20	132
18	8.30	2.15	121	4.45	2.12	114	8.00	2.20	132	5.00	2.35	174
19	6.35	2.10	110	6.30	1.98	89	8.20	2.40	190	5.10	2.40	190
20	6.30	2.00	92	5.40	2.00	92	7.20	2.50	228	4.45	2.52	237
21	6.00	2.05	101	5.00	2.02	96	7.50	2.60	272	5.00	2.60	272
22	6.35	2.02	96	6.00	1.92	80	6.20	2.60	272	5.40	2.60	272
23	7.15	2.00	92	6.00	2.00	92	7.00	2.60	272	5.15	2.62	282
24	7.35	1.95	84	6.10	1.92	80	....	....	....	5.10	2.65	297
25	11.00	2.20	132	4.30	2.22	137	6.30	2.62	282	5.15	2.60	272
26	6.30	2.20	132	5.30	2.25	145	6.40	2.60	272	5.45	2.52	237
27	7.45	2.28	153	5.15	2.30	158	6.35	2.52	237	5.15	2.50	228
28	8.00	2.30	158	6.30	2.32	164	6.10	2.48	220	5.40	2.45	209
29	8.00	2.35	174	6.00	2.38	184	7.20	2.40	190	....	....	....
30	6.30	2.38	184	6.50	2.32	164	6.00	2.48	220	6.35	2.40	190
31	7.00	2.32	164	6.00	2.32	164	....	....	....	....	....	....

Daily gage height, in feet, and discharge, in second-feet, of Clyde River at West Derby, Vt., for 1912—Continued.

Day.	October.						November.					
	A. M.			P. M.			A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	6.50	2.40	190	4.10	2.42	198	6.30	2.42	198	4.15	2.45	209
2	7.00	2.42	198	4.40	2.42	198	6.20	2.40	190	4.20	2.38	184
3	7.30	2.45	209	5.15	2.42	198	8.00	2.38	184	4.45	2.35	174
4	7.30	2.45	209	5.25	2.45	209	6.30	2.38	184	4.30	2.32	164
5	7.00	2.42	198	5.45	2.40	190	8.25	2.35	174	4.45	2.32	164
6	8.00	2.40	190	5.15	2.40	190	7.20	2.32	164	4.35	2.32	164
7	8.00	2.38	184	5.00	2.35	174	7.10	2.35	174	4.15	2.38	184
8	7.30	2.35	174	5.15	2.35	174	7.00	2.55	250	4.15	2.60	272
9	7.00	2.30	158	5.25	2.30	158	6.45	2.60	272	4.10	2.62	282
10	6.45	2.38	184	5.25	2.35	174	......	......	......	4.25	2.70	322
11	6.45	2.35	174	4.30	2.30	158	6.30	2.72	333	4.45	2.75	350
12	7.25	2.25	145	5.30	2.28	153	7.50	2.75	350	4.15	2.75	350
13	7.20	2.30	158	5.15	2.30	158	8.15	2.70	322	4.10	2.72	333
14	7.20	2.25	145	4.30	2.28	153	7.45	2.80	378	4.20	2.78	367
15	7.10	2.32	164	5.00	2.32	164	7.30	2.80	378	4.30	2.78	367
16	6.50	2.35	174	5.00	2.32	164	8.05	2.72	333	4.45	2.75	350
17	6.35	2.32	164	6.50	2.30	158	7.25	2.72	333	4.15	2.70	322
18	7.30	2.32	164	5.00	2.32	164	7.25	2.70	322	4.10	2.68	312
19	6.40	2.30	158	4.20	2.32	164	7.10	2.68	312	4.15	2.65	297
20	10.00	2.28	153	5.35	2.25	145	7.20	2.62	282	4.30	2.60	272
21	6.30	2.25	145	5.00	2.22	137	7.55	2.58	263	4.15	2.55	250
22	6.55	2.22	137	5.15	2.20	132	7.15	2.55	250	4.30	2.50	228
23	......	......	......	4.45	2.22	137	7.15	2.52	237	4.20	2.50	228
24	8.00	2.35	174	4.25	2.32	164	8.00	2.55	250	4.15	2.52	237
25	7.30	2.38	184	4.45	2.40	190	7.45	2.52	237	4.10	2.52	237
26	7.00	2.38	184	4.20	2.45	209	7.15	2.52	237	4.15	2.55	250
27	7.00	2.40	190	5.30	2.52	237	7.35	2.50	228	4.15	2.50	228
28	7.30	2.48	220	4.45	2.45	209	7.30	2.45	209	4.30	2.48	220
29	7.20	2.55	250	4.30	2.52	237	7.35	2.45	209	4.10	2.42	198
30	7.20	2.52	237	4.40	2.52	237	8.00	2.40	190	4.15	2.38	184
31	7.00	2.50	228	4.30	2.50	228	......	......	......	......	......	......

Day.	December.						Day.	December.					
	A. M.			P. M.				A. M.			P. M.		
	Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.		Time.	Gage height.	Discharge.	Time.	Gage height.	Discharge.
1	7.45	2.38	184	4.25	2.38	184	16	7.55	2.32	164	4.15	2.30	158
2	7.10	2.35	174	......	......	......	17	8.00	2.35	174	4.00	2.30	158
3	7.20	2.42	198	......	......	......	18	7.30	2.30	158	3.30	2.30	158
4	7.50	2.45	209	4.20	2.48	220	19	7.50	2.35	174	4.00	2.60	272
5	7.50	2.50	228	4.15	2.50	228	20	8.00	2.50	228	4.40	2.50	228
6	7.45	2.52	237	4.10	2.55	250	21	8.00	2.60	272	4.25	2.65	297
7	7.50	2.55	250	4.20	2.55	250	22	......	......	......	4.05	2.92	457
8	7.55	2.52	237	4.00	2.55	250	23	7.30	2.80	378	4.30	2.50	228
9	7.50	2.52	237	4.15	2.50	228	24	7.50	2.62	282	4.15	2.60	272
10	8.10	2.52	237	4.10	2.48	220	25	8.00	2.60	272	4.25	2.50	228
11	7.50	2.48	220	4.10	2.45	209	26	7.30	2.48	220	4.15	2.48	220
12	7.45	2.45	209	......	......	......	27	7.30	2.42	198	3.50	2.45	209
13	7.55	2.60	272	4.30	2.62	282	28	7.15	2.42	198	4.15	2.40	190
14	7.25	2.68	312	4.00	2.38	184	29	8.00	2.38	184	4.15	2.38	184
15	7.45	2.35	174	4.35	2.35	174	30	7.00	2.40	190	4.00	2.40	190
							31	7.30	2.40	190	4.15	2.38	184

NOTE.—Possibly slight backwater from ice during the first week in April. Daily discharge determined from a well-defined rating curve.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous measurements were made on streams in the St. Lawrence River basin in 1912:

Miscellaneous measurements in St. Lawrence River drainage basin in 1912.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Aug. 20	Pigeon River	Lake Superior	Near mouth		78.9
20	Brule River	do	do	0.25	32.5
21	Devil Track River	do	do		16.2
21	do	do	do		11.7
22	Cascade River	do	do		29.8
22	Temperance River	do	do		27.6
23	Cross River	do	do		12.7
23	Manitou River	do	do		34.0
23	Baptism River	do	do		28.7
Sept. 20	Au Sable River	Lake Huron	Redheads, Mich	1.12	1,030
17	do	do	Oscoda, Mich	1.46	1,220
Apr. 6[a]	Canaseraga Creek	Genesee River	Shakers Crossing, N. Y	[b] 16.33	1,970
July 16	do	do	do	[b] 3.63	236
16	Mount Morris power canal	do	Mount Morris, N.Y	[c] 2.52	215
29	Black River	Lake Ontario	Port Leyden, N. Y	15.16	233
Oct. 17	Beaver River	Black River	Beaver River, N. Y	[d] 4.70	[e] 184
18	do	do	do	[d] 4.70	[f] 139
18	do	do	do	[d] 4.70	[g] 263
Dec. 18	South Branch of Oswegatchie River.	Oswegatchie River	Hyatt, N. Y	[h] 9.78	578
Feb. 20[i]	Winooski River	Lake Champlain	Above Stevens Branch, near Montpelier, Vt.	2.67	150
June 15	do	do	do	3.27	226
Sept. 5	do	do	do	2.75	130
Oct. 12	do	do	do	2.30	47

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[a] Measurement affected by backwater from Genesee River.

[b] Gage datum is 25 feet below reference point on downstream horizontal tiebar 20 feet from left end of bridge.

[c] Gage at highway bridge below mills.

[d] Distance from block on gatehouse to water surface.

[e] Gate No. 1 open.

[f] Gate No. 4 open 2 feet.

[g] Gates Nos. 1 and 4 open 2 feet each.

[h] Distance to water surface from top of downstream left corner of right abutment.

[i] Measurement made under complete ice cover.

SUMMARY OF MEAN DISCHARGE PER SQUARE MILE.

The following summary of discharge per square mile is given to allow ready comparison of relative rates of run-off from different areas in the St. Lawrence River drainage basin. It shows in a general way the seasonal distribution of run-off, and the effect of snow, ground, surface, and artificial storage. The most important fact worth noting is the almost entire lack of uniformity or agreement between any two streams, which indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, for river stations in the St. Lawrence River drainage basin in 1912.

Station.	Drainage area.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
	Sq. m.													
Beaver Bay River at Beaver Bay, Minn	120	0.17	0.08	0.06	4.39	3.82	1.24	0.14	0.22	0.56	0.32	0.18	0.08	0.93
St. Louis River near Thomson, Minn	3,420	.14	.10	.13	.75	2.41	1.21	.41	.20	.36	.37	.19	.12	.54
Whiteface River at Meadowlands, Minn	442	....	....	....	....	1.96	1.34	.19	.12	.21	.18	....	....	....
Whiteface River below Meadowlands, Minn	446	....	....	....	....	1.94	1.30	.18	.10	.20	.17	....	....	....
Cloquet River at Independence, Minn	698	.22	.20	.27	.46	1.89	1.35	1.18	.31	.32	.70	.20	.19	.61
Escanaba River at Escanaba, Mich	800	1.12	1.06	1.04	4.81	3.06	1.32	.52	1.12	1.29	1.23	.91	.81	1.52
Menominee River near Iron Mountain, Mich	2,420	1.07	1.00	.98	2.23	2.66	1.25	.64	1.42	1.09	.88	.64	.77	1.22
Wolf River at Keshena, Wis	797	.78	.48	.56	1.68	1.73	1.13	1.28	1.61	1.99	1.19	1.06	1.22	1.23
West Branch of Wolf River at Neopit, Wis	108	1.11	1.23	1.03	1.67	1.65	1.25	1.74	....	....	....	1.23	1.35	....
Manistee River near Sherman, Mich	900	1.28	1.17	1.16	1.78	1.73	1.41	1.18	1.20	1.44	1.27	1.46	1.42	1.38
Tittabawasee River at Freeland, Mich	2,550	.60	.52	1.18	4.20	3.62	1.13	.82	.58	.72	.91	1.69	1.27	1.44
Huron River at Geddes, Mich	757	.33	.30	1.10	2.21	.81	.33	.15	.36	.46	.57	1.01	.62	.69
Cattaraugus Creek at Versailles, N. Y	467	1.01	.62	4.39	5.55	1.48	.42	.41	.60	1.00	1.09	1.12	2.18	1.66
Little Tonawanda Creek at Linden, N. Y	22	....	....	....	....	....	....	....	.14	.07	.09	.24	.63	....
Genesee River at St. Helena, N. Y	1,030	.65	.40	3.40	4.71	1.23	.24	.15	.17	.47	.60	.74	.95	1.15
Genesee River at Jones Bridge, N. Y	1,410	.55	.41	3.19	4.33	1.19	.27	.18	.21	.50	.58	.70	.95	1.09
Genesee River at Rochester, N. Y	2,360	.56	.41	2.88	4.24	1.21	.33	.17	.14	.28	.32	.41	.68	.97
Canaseraga Creek near Dansville, N. Y	167	....	....	3.17	2.84	1.60	.56	1.09	.30	.50	.30	.44	.71	....
Keshequa Creek at Sonyea, N. Y	67	....	....	3.06	3.34	.61	.11	.11	.07	.13	.16	.25	.56	....
Canadice Lake outlet near Hemlock, N. Y	12.6	.78	.67	1.30	3.88	1.19	.75	.60	.42	.41	.45	.52	.57	.96
Oneida River at Caughdenoy, N. Y	1,377	1.86	.98	1.56	5.60	3.36	1.87	.61	.42	.80	1.31	1.54	2.26	1.85
Salmon River at Stillwater Bridge near Redfield, N. Y	191	1.31	1.05	1.69	15.4	5.92	1.53	.53	.65	1.74	3.03	3.08	4.47	3.36
Salmon River near Pulaski, N. Y	260	1.31	1.04	1.69	16.0	5.81	1.73	.53	.59	1.71	3.01	3.32	4.04	3.38
Orwell Brook near Altmar, N. Y	22.1	....	....	....	10.5	3.21	1.37	.54	.81	1.32	2.06	2.59	3.30	....
Black River near Boonville, N. Y	303	1.55	1.14	3.11	9.90	4.75	1.27	.20	.17	.88	1.12	2.24	2.66	2.41
Black River near Felts Mills, N. Y	1,851	1.22	1.17	1.75	8.45	3.83	1.99	.62	.58	.94	1.38	1.69	1.76	2.11
Moose River at Moose River, N. Y	370	1.30	.72	1.45	7.30	5.24	1.54	.58	.65	1.05	2.00	2.76	2.14	2.23
Middle branch of Moose River at Old Forge, N. Y	51.5	1.85	2.29	1.72	4.49	4.08	1.17	1.24	1.29	1.90	2.15	2.90	2.78	2.31
Oswegatchie River near Ogdensburg, N. Y	1,580	1.19	.53	1.32	6.33	2.58	3.19	.43	.39	.84	1.27	3.11	3.53	2.05
East Branch of Oswegatchie River at Newton Falls, N. Y	194	....	....	....	....	....	....	....	....	....	....	2.01	2.37	....
Raquette River at Raquette Falls, N. Y	418	1.80	.74	.61	6.05	5.38	2.46	.39	.44	.84	1.27	....	....	....
Raquette River at Piercefield, N. Y	723	1.67	.77	.58	3.15	4.61	2.41	.46	.44	.59	1.18	2.61	1.91	1.69
Raquette River at Massena Springs, N. Y	1,170	1.28	.65	.83	5.32	4.22	2.62	.41	.44	.75	1.03	2.36	3.37	1.94
Bog River near Tupper Lake, N. Y	132	....	....	....	5.75	3.75	2.20	....	....	....	....	....	....	....
St. Regis River at Brasher Center, N. Y	621	1.26	.60	.74	8.00	3.24	2.09	.50	.82	1.82	1.41	2.30	3.53	2.19
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○

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 325

SURFACE WATER SUPPLY OF THE UNITED STATES

1912

PART V. UPPER MISSISSIPPI RIVER AND HUDSON BAY BASINS

BY

A. H. HORTON, W. G. HOYT
AND H. J. JACKSON

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SURFACE WATER SUPPLY OF UPPER MISSISSIPPI RIVER AND HUDSON BAY BASINS, 1912.

By A. H. HORTON, W. G. HOYT, and H. J. JACKSON

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 12 reports presenting results of measurements of flow made on streams in the United States during the calendar year 1912.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394) which contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1913.

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1913, inclusive	150,000

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting the data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected and of the second kind on page 16.

Measurements of stream flow have been made at about 2,000 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1912 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular water supply papers from time to time.

PUBLICATIONS.

A report for each calendar year has been prepared embodying the stream-flow data collected during that year. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119. Circulars are also available giving complete lists of the gaging stations maintained by the Survey to date, and a list of the reports relating to the water supply of the country.

Prior to 1902 gage heights and discharge measurements were published in water-supply papers of bulletins and estimates of monthly discharge in annual reports; since 1902 both classes of data have been published in water-supply papers, and they are now being published in 12 parts, as shown in the following table:

Papers on surface water supply of the United States, 1912.

Part.[a]	No.	Title.
I	321	North Atlantic coast basins.
II	322	South Atlantic coast and eastern Gulf of Mexico basins.
III	323	Ohio River basin.
IV	324	St. Lawrence River basin.
V	325	Upper Mississippi River and Hudson Bay basins.
VI	326	Missouri River basin.
VII	327	Lower Mississippi River basin.
VIII	328	Western Gulf of Mexico basins.
IX	329	Colorado River basin.
X	330	Great Basin.
XI	331	Pacific coast basins in California.
XII	332	North Pacific coast basins.

[a] For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

A list of reports containing stream-flow data is presented in the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A, pt. 2	....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	....do	1903.
WS 124 to 135	....do	1904.
WS 165 to 178	....do	1905.
WS 210 to 214	....do	1906.
WS 241 to 252	....do	1907-8.
WS 261 to 272	....do	1909.
WS 281 to 292	....do	1910.
WS 301 to 312	....do	1911.
WS 321 to 332	....do	1912.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1911. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for any station in the area covered by Part I are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, and 321, which contain records for the New England streams from 1903 to 1912. The year covered by the report is indicated at the head of the column in which the paper is listed.

Numbers of water-supply papers containing results of stream measurements, 1899–1912.

	1899[a]	1900[b]	1901	1902	1903	1904
North Atlantic coast (St. John River to York River)	35	47, [c]48	65, 75	82	97	[d]124, [e]125, [f]126
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[g]35, 36	48	65, 75	[g]82, 83	[g]97, 98	[f]126, 127
Ohio River basin	36	48, [h]49	65, 75	83	98	128
St. Lawrence River and Great Lakes	36	49	65, 75	[i]82, 83	97	129
Hudson Bay and upper Mississippi River	36	49	[j]65, 66, 75	[j]83, 85	[j]98, 99, 100	[j]128, 130
Missouri River	[k]36, 37	49, [l]50	66, 75	84	99	130, [m]131
Lower Mississippi River	37	50	[j]65, 66, 75	[j]83, 84	[j]98, 99	[j]128, 131
Western Gulf of Mexico	37	50	66, 75	84	99	132
Colorado River	[n]37, 38	50	66, 75	85	100	133
Great Basin	38, [p]39	51	66, 75	85	100	133, [q]134
Pacific coast in California	38, [r]39	51	66, 75	85	100	134
North Pacific coast	38	51	66, 75	85	100	135

	1905	1906	1907–8	1909	1910	1911	1912
North Atlantic coast (St. John River to York River)	[d]165, [e]166, [f]167	[d]201, [e]202, [f]203	241	261	281	301	321
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi)	[f]167, 168	[f]203, 204	242	262	282	302	322
Ohio River basin	169	205	243	263	283	303	323
St. Lawrence River and Great Lakes	170	206	244	264	284	304	324
Hudson Bay and upper Mississippi River	171	207	245	265	285	305	325
Missouri River	172	208	246	266	286	306	326
Lower Mississippi River	[j]169, 173	[j]205, 209	247	267	287	307	327
Western Gulf of Mexico	174	210	248	268	288	308	328
Colorado River	175, [o]177	211	249	269	289	309	329
Great Basin	176, [q]177	212, [q]213	250, [q]251	270, [q]271	290	310	330
Pacific coast in California	177	213	251	271	291	311	331
North Pacific coast	[s]177, 178	214	252	272	292	312	332

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, part 4.

[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Estimates for 1900 in Twenty-second Annual Report, part 4.

[c] Wissahickon and Schuylkill rivers to James River.

[d] New England rivers only.

[e] Hudson River to Delaware River, inclusive.

[f] Susquehanna River to Yadkin River, inclusive.

[g] James River only.

[h] Scioto River.

[i] Lake Ontario and tributaries to St. Lawrence River proper.

[j] Tributaries of Mississippi from east.

[k] Gallatin River.

[l] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[m] Platte and Kansas rivers.

[n] Green and Gunnison rivers and Grand River above junction with Gunnison.

[o] Below junction with Gila.

[p] Mohave River only.

[q] Great Basin in California, excepting Truckee and Carson drainage basins.

[r] Kings and Kern rivers and south Pacific coast drainage basins.

[s] Rogue, Umpqua, and Siletz rivers only.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Newport, Ky., Federal Building.
Madison, Wis., care of the Railroad Commission, Capital Building.
St. Paul, Minn., Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 302 Chamber of Commerce Building.
Salt Lake City, Utah, Brooks Arcade.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
San Francisco, Cal., 505 Custom House.
Santa Fe, N. Mex., Capitol Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications will be sent on application to the Director of the United States Geological Survey, Washington, D. C.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile; and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge in second-feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	0.03719	1.041	1.079	1.116	1.153
2.........	.07438	2.083	2.157	2.231	2.306
3.........	.11157	3.124	3.236	3.347	3.459
4.........	.14876	4.165	4.314	4.463	4.612
5.........	.18595	5.207	5.393	5.578	5.764
6.........	.22314	6.248	6.471	6.694	6.917
7.........	.26033	7.289	7.550	7.810	8.070
8.........	.29752	8.331	8.628	8.926	9.223
9.........	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge in second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	1.983	55.54	57.52	59.50	61.49
2.........	3.967	111.1	115.0	119.0	123.0
3.........	5.950	166.6	172.6	178.5	184.5
4.........	7.934	222.1	230.1	238.0	246.0
5.........	9.917	277.7	287.6	297.5	307.4
6.........	11.90	333.2	345.1	357.0	368.9
7.........	13.88	388.8	402.6	416.5	430.4
8.........	15.87	444.3	460.2	476.0	491.9
9.........	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-feet.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square miles equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$=net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge by plotting gage heights in feet as ordinates and discharge in second-feet as abscissas.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

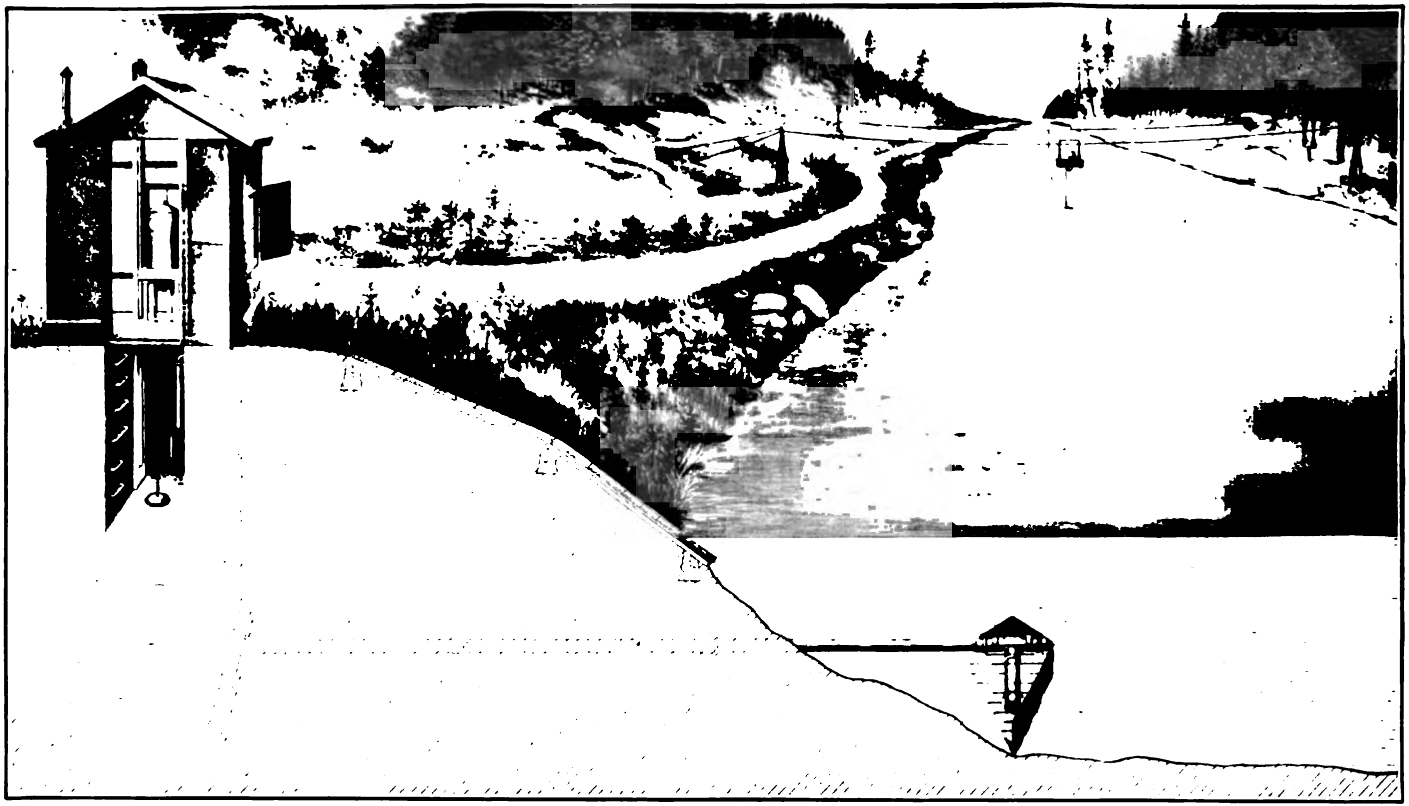
In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 11, are based.

The base data presented in this report, unless otherwise stated in description of station, have been collected by the methods commonly used at current-meter gaging stations and described in standard textbooks.

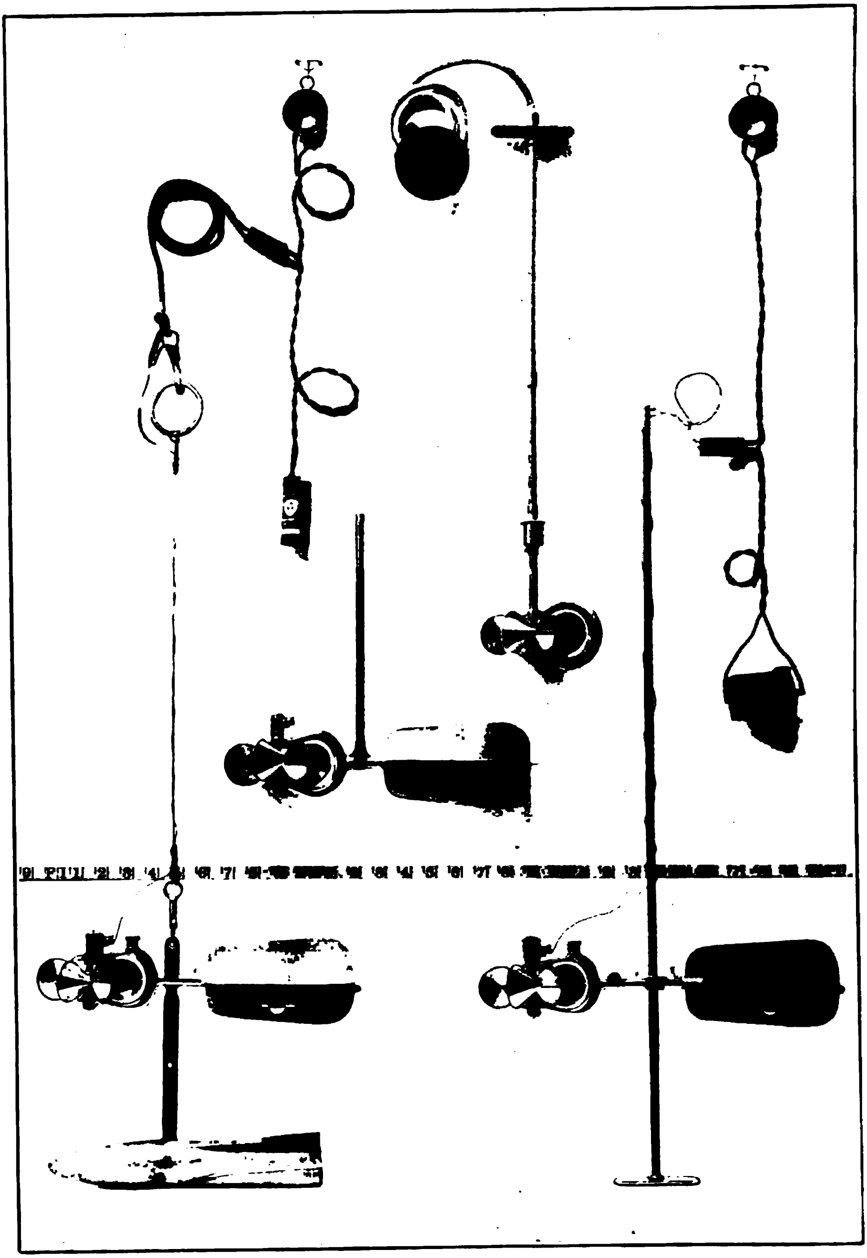
Plate I shows typical gaging stations. Plate II shows current meters used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.



TYPICAL GAGING STATIONS.



PRICE CURRENT METERS.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the Survey engineers are published, not only to comply with the law, but also to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION.

The work in Minnesota during 1912 has been done with State cooperation under terms of an act of the legislature of 1909 as embodied in joint resolution 19, which reads as follows:

> Whereas the water supplies, water powers, navigation of our rivers, drainage of our lands, and the sanitary condition of our streams and their watersheds generally form one great asset and present one great problem, therefore: *Be it resolved by the house of representatives, the senate concurring,* That the State Drainage Commission be, and is hereby, directed to investigate progress in other States toward the solution of said problem in such States, to investigate and determine the nature of soil problem in this State.

The work has been carried on in conjunction with the State Drainage Commission, George A. Ralph, chief engineer.

The State of Illinois cooperated in stream-gaging work in that State, the appropriation being under the control of the Rivers and Lakes Commission, Robert R. McCormick, chairman.

DIVISION OF WORK.

The field data in the Hudson Bay drainage basin, except in Minnesota, were collected under the direction of W. A. Lamb, district engineer, Helena, Mont., by E. F. Chandler, R. R. Randell, George Ebner, Goric Monley, and W. B. Stevenson. The ratings and studies of the completed data were made by W. A. Lamb, E. F. Chandler, G. C. Stevens, and B. E. Jones. Estimates of flow during periods when the relation of gage height to discharge was affected by ice were made by G. C. Stevens, B. E. Jones, and E. F. Chandler.

The field data in the Hudson Bay drainage basin in Minnesota were collected under the direction of W. G. Hoyt, district engineer, St. Paul, Minn., by E. F. Chandler, S. B. Soulé, George Ebner, Goric Monley, W. B. Stevenson, and E. J. Budge. The ratings and studies of the completed data were made by W. G. Hoyt, E. F. Chandler, and H. J. Jackson. The estimates of flow during periods when the relation of gage height to discharge was affected by ice were made by W. G. Hoyt and E. F. Chandler.

The field data for the upper Mississippi River drainage basin, except in Illinois, were collected under the direction of W. G. Hoyt, district engineer, St. Paul, Minn., by S. B. Soulé, B. J. Peterson, and M. J. Orbeck. The ratings and studies of the completed data were made by W. G. Hoyt and H. J. Jackson. Estimates of flow when the relation of gage height to discharge was affected by ice were made by W. G. Hoyt.

In the upper Mississippi River drainage basin in Illinois the field data were collected under the direction of A. H. Horton, district engineer, Newport, Ky., by P. S. Monk. The ratings and studies of the completed data were made by A. H. Horton and H. J. Jackson. Estimates of flow during periods when the relation of gage height to discharge was affected by ice were made by H. J. Jackson.

The completed data for the report, except the stations in Montana and North Dakota, were prepared for publication by H. J. Jackson, assistant engineer. Data for stations in Montana and North Dakota were prepared for publication by G. C. Stevens, assistant engineer.

The computations were made under the direction of H. J. Jackson and G. C. Stevens, by J. G. Mathers, H. D. Padgett, H. J. Dean, C. L. Batchelder, and M. I. Walters.

The report was edited by Mrs. B. D. Wood.

STATION RECORDS.

HUDSON BAY DRAINAGE AREA IN THE UNITED STATES.

ST. MARY RIVER NEAR BABB, MONT.[1]

Location.—Near dam site a quarter of a mile below the outlet of Lower St. Mary Lake, 1 mile above the mouth of Swiftcurrent Creek, and about 2 miles south of Babb, Mont.

Records available.—April 9, 1902, to December 31, 1912.

Drainage area.—177 square miles.

Gage.—Chain gage on the right bank of the stream; datum unchanged. A temporary low-water gage has been used during the winter months.

Channel.—Practically permanent.

Discharge measurements.—Made from cable 300 feet below the gage. In September, 1909, the cable was moved from a point 300 feet farther downstream. Low-water measurements are made by wading one-fourth mile above the gage.

Winter flow.—The channel freezes over at the gage and considerable ice exists in the stream, but records are not believed to be seriously affected thereby.

Floods.—The flood of June 5, 1908, reached a stage of about 9.4 feet.

Accuracy.—Rating curve is well defined except for winter months. Inaccuracies in datum of temporary gage and possible effect from ice affect the winter records. The winter estimates are believed to be fair, however.

Discharge measurements of St. Mary River near Babb, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 16[a]	W. A. Lamb	0.68	49
July 2	R. R. Randell	3.58	1,330
Dec. 16[b]	W. A. Lamb	1.16	117

[a] By wading 200 yards above gage. Ice along both banks at gage and at control; channel open at control.
[b] From cable. Ice on edges at gage and at cable.

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[1] The records for this station were published in Water-Supply Papers 85 and 100 as "St. Mary River at dam site near St. Mary," and in Water-Supply Paper 130 as "St. Mary River near St. Mary."

Daily gage height, in feet, of St. Mary River near Babb, Mont., for 1912.

[Carl Giruin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.8	0.90	0.78	0.78	1.6	3.6	3.6	2.7	1.9	1.5	1.5	1.4
2	.8	.90	.78	.78	1.7	3.6	3.6	2.6	1.9	1.4	1.55	1.3
3	.8	.90	.78	.80	1.8	3.6	3.5	2.6	1.85	1.4	1.5	1.3
4	.8	.87	.78	.80	1.9	3.6	3.4	2.6	1.9	1.35	1.5	1.35
5	.8	.87	.78	.83	1.9	3.5	3.4	2.6	1.8	1.4	1.5	1.3
6	.8	.85	.78	.86	1.9	3.4	3.3	2.6	1.85	1.4	1.5	1.3
7	.8	.85	.78	.90	1.95	3.4	3.3	2.6	1.8	1.35	1.5	1.3
8	.8	.83	.78	.90	2.0	3.4	3.2	2.6	1.85	1.4	1.45	1.25
9	.8	.80	.78	.92	2.1	3.4	3.1	2.6	1.85	1.4	1.5	1.3
10	.8	.80	.75	.95	2.1	3.5	3.0	2.5	1.85	1.3	1.45	1.3
11	.8	.80	.75	1.05	2.2	3.6	3.0	2.5	1.9	1.35	1.45	1.2
12	.8	.80	.72	1.1	2.3	3.8	2.9	2.45	1.85	1.3	1.5	1.2
13	.85	.78	.72	1.15	2.5	3.8	2.8	2.45	1.9	1.35	1.5	1.2
14	.9	.78	.70	1.07	2.6	3.8	2.8	2.4	1.9	1.3	1.6	1.2
15	.9	.78	.70	1.10	3.0	3.8	2.8	2.35	1.8	1.4	1.55	1.15
16	.9	.78	.68	1.30	3.2	3.8	2.8	2.3	1.85	1.4	1.55	1.2
17	.9	.78	.68	1.32	3.4	3.7	2.7	2.3	1.85	1.4	1.6	1.2
18	.9	.78	.68	1.38	3.6	3.6	2.7	2.25	1.8	1.4	1.55	1.2
19	.9	.78	.68	1.42	3.7	3.6	2.7	2.2	1.8	1.5	1.6	1.15
20	.9	.78	.68	1.48	3.8	3.6	2.6	2.2	1.75	1.5	1.6	1.15
21	.9	.78	.68	1.50	4.0	3.6	2.6	2.2	1.8	1.55	1.5	1.1
22	.9	.78	.68	1.5	4.0	3.6	2.7	2.1	1.7	1.5	1.5	1.1
23	.9	.78	.68	1.6	4.0	3.6	2.8	2.1	1.7	1.6	1.5	1.1
24	.9	.78	.68	1.6	3.9	3.6	2.8	2.1	1.7	1.55	1.5	1.1
25	.9	.78	.68	1.65	3.8	3.6	2.8	2.1	1.6	1.6	1.45	1.1
26	.9	.78	.70	1.7	3.8	3.6	2.9	2.1	1 65	1.55	1.5	1.05
27	.9	.78	.70	1.7	3.8	3.6	2.9	2.1	1.6	1.5	1.4	1.0
28	.9	.78	.70	1.7	3.7	3.6	2.8	2.0	1.6	1.6	1.4	1.0
29	.9	.78	.72	1.75	3.7	3.6	2.8	2.0	1.55	1.55	1.4	1.0
30	.9	....	.72	1.65	3.6	3.6	2.8	2.0	1.55	1.6	1.35	.95
31	.9	....	.72	....	3.6	....	2.7	1.95	....	1.55	....	.95

NOTE.—Temporary gage used Jan. 1 to Apr. 13. Ice present in the stream from Jan. 1 to about Mar. 25.

Daily discharge, in second-feet, of St. Mary River near Babb, Mont., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	38	73	57	57	253	1,360	1,360	755	366	217	217	183
2	42	73	57	57	290	1,360	1,360	700	366	183	235	153
3	46	73	57	59	328	1,360	1,280	700	347	183	217	153
4	50	69	57	59	366	1,360	1,200	700	366	168	217	168
5	54	69	57	63	366	1,280	1,200	700	328	183	217	153
6	59	66	57	67	366	1,200	1,130	700	347	183	217	153
7	59	66	57	73	386	1,200	1,130	700	328	168	217	153
8	59	63	57	73	405	1,200	1,060	700	347	183	200	140
9	59	59	57	76	445	1,200	995	700	347	183	217	153
10	59	59	53	81	445	1,280	935	645	347	153	200	153
11	59	59	53	98	490	1,360	935	645	366	168	200	128
12	59	59	49	107	540	1,520	875	618	347	153	217	128
13	66	57	49	118	645	1,520	815	618	366	168	217	128
14	73	57	47	102	700	1,520	815	590	366	153	253	128
15	73	57	47	107	935	1,520	815	565	328	183	235	118
16	73	57	45	153	1,060	1,520	815	540	347	183	235	128
17	73	57	45	159	1,200	1,440	755	540	347	183	253	128
18	73	57	45	177	1,360	1,360	755	515	328	183	235	128
19	73	57	45	190	1,440	1,360	755	490	328	217	253	118
20	73	57	45	210	1,520	1,360	700	490	309	217	253	118
21	73	57	45	217	1,680	1,360	700	490	328	235	217	107
22	73	57	45	217	1,680	1,360	755	445	290	217	217	107
23	73	57	45	253	1,680	1,360	815	445	290	253	217	107
24	73	57	45	253	1,600	1,360	815	445	290	235	217	107
25	73	57	45	272	1,520	1,360	815	445	253	253	200	107
26	73	57	47	290	1,520	1,360	875	445	272	235	217	89
27	73	57	47	290	1,520	1,360	875	445	253	217	183	89
28	73	57	47	290	1,440	1,360	815	405	253	253	183	89
29	73	57	49	309	1,440	1,360	815	405	235	235	183	89
30	73	....	49	272	1,360	1,360	815	405	235	253	168	81
31	73	....	49	....	1,360	....	755	386	....	235	....	81

NOTE.—Daily discharge determined from a rating curve well defined except for the winter months. Discharge Jan. 1 to 5 interpolated because of doubtful accuracy of gage heights from temporary gage and possible backwater from ice.

Monthly discharge of St. Mary River near Babb, Mont., for 1912.

[Drainage area, 177 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	73		65.3	0.369	0.43	4,020	D.
February	73	57	60.6	.342	.37	3,490	C.
March	57	45	50.0	.282	.33	3,070	C.
April	309	57	158	.893	1.00	9,400	B.
May	1,680	253	979	5.53	6.38	60,200	A.
June	1,520	1,200	1,360	7.68	8.57	80,900	A.
July	1,360	700	920	5.20	6.00	56,600	A.
August	755	386	560	3.16	3.64	34,400	A.
September	366	235	321	1.81	2.02	19,100	A.
October	253	153	201	1.14	1.31	12,400	A.
November	253	168	217	1.23	1.37	12,900	A.
December	183	81	125	.706	.81	7.690	B.
The year	1,680		419	2.37	32.23	304,000	

ST. MARY RIVER BELOW SWIFTCURRENT CREEK, AT BABB, MONT.[1]

Location.—At Babb, Mont., about 1 mile below the mouth of Swiftcurrent Creek.

Records available.—July 14, 1901, to October 18, 1902, and May 13, 1910, to December 31, 1912.

Drainage area.—298 square miles.

Gage.—The original gage was a staff nailed to a pier of the highway bridge at Babb. This gage was used in 1901 and 1902, and was destroyed by the flood of June 5, 1908. On May 13, 1910, a staff gage was installed on the left bank about 75 feet below the old site, and at a different datum. A temporary chain gage was also installed for low-water readings. On July 19, 1911, a new chain gage was installed on the right bank, about 100 feet farther downstream, and at a different datum. On May 1, 1912, a gage was established on an overflow channel from Swiftcurrent Creek and gage readings obtained from May 2 to November 24. This overflow discharges into St. Mary River below the gage.

Channel.—Likely to change.

Discharge measurements.—In 1901 and 1902, made from highway bridge; in 1910, from a footbridge 100 feet above the gage; in 1911, from a cable, 50 feet above the gage. Low-water measurements are made by wading. The overflow from Swiftcurrent Creek is measured from a footbridge.

Floods.—Probably the highest stage was reached June 5, 1908. No records of this flood were obtained at this point.

Winter flow.—Gage heights are affected by ice during the winter months.

Accuracy.—Rating curves for the main stream and for Swiftcurrent Creek overflow are well defined and records are excellent except during the winter months.

Discharge measurements of St. Mary River below Swiftcurrent Creek, at Babb, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 16	W. A. Lamb	3.45	58	Aug. 17	W. A. Lamb	4.88	687
May 1	do	4.65	514	Sept. 19	do	4.52	458
June 8	R. R. Randell	6.05	1,580	Dec. 16	do	3.89	177
July 2	do	6.38	1,740				

NOTE.—These measurements do not include the overflow from Swiftcurrent Creek.

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[1] The records at this station for 1901 and 1902 were published in Water-Supply Paper 66 as for "St. Mary River at Main, Mont."

Discharge measurements of Swiftcurrent Creek overflow at Babb, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 1	W. A. Lamb	5.55	44.7	Aug. 17	W. A. Lamb	5.45	40.2
June 8	do	6.25	108	Sept. 19	do	[a]5.0	12.7
July 2	R. R. Randell	6.37	110	Dec. 16	do	4.4	[b]2.0

[a] Approximate.

[b] Estimated.

Daily gage height, in feet, of St. Mary River below Swiftcurrent Creek, at Babb, Mont., for 1912.

[Carl Giruin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	3.75	3.6	3.65	4.6	6.6	6.5	5.6	4.5	4.25	4.3	4.2
2	3.8	3.75	3.6	3.68	4.7	6.6	6.5	5.7	4.55	4.2	4.3	4.2
3	3.8	3.75	3.6	3.9	4.7	6.5	6.5	5.5	4.5	4.2	4.3	4.2
4	4.0	3.73	3.6	3.95	4.7	6.4	6.4	5.4	4.5	4.2	4.3	4.15
5	4.2	3.73	3.6	3.85	4.75	......	6.3	5.3	4.45	4.2	4.3	4.15
6	4.2	3.7	3.6	3.9	4.75	......	6.2	5.35	4.45	4.15	4.25	4.15
7	4.15	3.7	3.6	3.9	4.9	......	6.2	5.25	4.5	4.15	4.25	4.05
8	4.1	3.7	3.6	4.03	5.1	6.3	6.1	5.3	4.5	4.2	4.2	4.05
9	4.0	3.68	3.6	4.13	5.4	6.4	6.0	5.2	4.55	4.15	4.2	4.05
10	4.1	3.68	3.58	4.2	5.6	6.4	5.9	5.05	4.55	4.1	4.2	4.05
11	4.3	3.65	3.58	4.32	5.6	6.6	5.8	5.1	4.55	4.05	4.2	4.05
12	4.0	3.65	3.55	4.33	5.7	6.7	5.7	4.95	4.6	4.05	4.25	3.95
13	3.7	3.62	3.52	4.33	5.8	6.7	5.7	4.9	4.6	4.1	4.3	3.95
14	3.7	3.6	3.5	4.35	5.9	6.8	5.6	4.9	4.65	4.05	4.35	3.95
15	3.75	3.6	3.48	4.35	6.1	6.8	5.6	4.85	4.6	4.15	4.35	3.85
16	3.75	3.6	3.48	4.38	6.45	6.7	5.6	4.85	4.6	4.2	4.35	3.85
17	3.75	3.6	3.48	4.4	6.6	6.6	5.5	4.8	4.6	4.25	4.4	3.85
18	3.75	3.6	3.48	4.42	6.6	6.5	5.5	4.75	4.55	4.3	4.35	3.85
19	3.75	3.6	3.48	4.45	6.7	6.4	5.5	4.8	4.55	4.4	4.35	3.8
20	3.75	3.6	3.48	4.48	6.8	6.4	5.5	4.75	4.5	4.35	4.85	3.8
21	3.75	3.6	3.48	4.5	6.8	6.4	5.5	4.75	4.5	4.35	4.3	3.8
22	3.75	3.6	3.48	4.5	6.8	6.4	5.6	4.7	4.55	4.4	4.3	3.8
23	3.75	3.6	3.48	4.55	6.7	6.4	5.6	4.75	4.45	4.4	4.3	3.8
24	3.75	3.6	3.48	4.6	6.6	6.4	5.7	4.75	4.5	4.4	4.3	3.8
25	3.75	3.6	3.48	4.6	6.6	6.4	5.8	4.75	4.35	4.35	4.3	3.8
26	3.75	3.6	3.5	4.65	6.6	6.4	5.8	4.7	4.3	4.3	4.25	3.75
27	3.75	3.6	3.5	4.65	6.6	6.4	5.8	4.65	4.3	4.3	4.25	3.75
28	3.75	3.6	3.5	4.65	6.6	6.4	5.8	4.65	4.3	4.4	4.25	3.75
29	3.75	3.6	3.52	4.65	6.6	6.5	5.8	4.6	4.3	4.35	4.2	3.75
30	3.75	......	3.55	4.65	6.6	6.5	5.7	4.6	......	4.35	4.2	3.7
31	3.75	......	3.55	......	6.6	......	5.7	4.6	......	4.35	......	3.7

NOTE.—Relation of gage height to discharge probably affected by ice Jan. 1 to about Feb. 5.

Daily discharge, in second-feet, of St. Mary River below Swiftcurrent Creek, at Babb, Mont., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	91	104	525	1,960	1,880	1,180	447	324	347	307
2	......	91	113	562	1,960	1,880	1,260	475	302	347	307
3	......	91	184	562	1,880	1,880	1,100	447	302	347	307
4	......	91	203	562	1,800	1,800	1,030	447	302	347	285
5	......	91	167	593	1,780	1,720	961	421	302	347	285
6	118	91	184	593	1,760	1,640	997	421	281	324	285
7	118	91	184	688	1,740	1,640	926	447	281	324	242
8	118	91	234	822	1,720	1,560	961	447	302	302	242
9	113	91	276	1,030	1,800	1,480	891	475	281	302	242
10	113	86	307	1,180	1,800	1,400	788	475	260	302	242

Daily discharge, in second-feet, of St. Mary River below Swiftcurrent Creek, at Babb., Mont., for 1912—Continued.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	104	86	367	1,180	1,960	1,330	822	475	240	302	242
12	104	80	372	1,260	2,040	1,260	721	503	240	324	203
13	96	73	372	1,330	2,040	1,260	688	503	260	347	203
14	91	68	382	1,400	2,120	1,180	688	532	240	371	203
15	91	64	382	1,560	2,120	1,180	656	503	281	371	167
16	91	64	398	1,840	2,040	1,180	656	503	302	371	167
17	91	64	409	1,960	1,960	1,100	624	503	324	395	167
18	91	64	420	1,960	1,880	1,100	593	475	347	371	167
19	91	64	437	2,040	1,800	1,100	624	475	395	371	150
20	91	64	454	2,120	1,800	1,100	593	447	371	371	150
21	91	64	465	2,120	1,800	1,100	593	447	371	347	150
22	91	64	465	2,120	1,800	1,180	562	475	395	347	150
23	91	64	495	2,040	1,800	1,180	593	421	395	347	150
24	91	64	525	1,960	1,800	1,260	593	447	395	347	150
25	91	64	525	1,960	1,800	1,330	593	371	371	356	150
26	91	68	557	1,960	1,800	1,330	562	347	347	332	134
27	91	68	557	1,960	1,800	1,330	532	347	347	332	134
28	91	68	557	1,960	1,800	1,330	532	347	395	332	134
29	91	73	557	1,960	1,880	1,330	503	347	371	307	134
30	....	80	557	1,960	1,880	1,260	503	336	371	307	118
31	....	80	....	1,960	....	1,260	503	....	371	....	118

NOTE.—Daily discharge previous to May 2 and after Nov. 24 computed from a well-defined rating curve based on discharge measurements that include the flow in Swiftcurrent overflow channel. Discharge May 2 to Nov. 24 computed from a well-defined rating curve based on measurements that do not include the flow in the Swiftcurrent overflow channel.

Daily gage height, in feet, of Swiftcurrent Creek overflow at Babb, Mont., for 1912.

[Carl Giruin, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	6.5	6.4	5.8	5.0	4.9	5.0
2	5.45	6.55	6.4	5.75	5.0	4.9	4.95
3	5.42	6.45	6.4	5.7	5.0	4.9	4.95
4	5.4	6.45	6.35	5.7	5.0	4.85	4.9
5	5.35	6.4	6.3	5.7	4.95	4.85	4.85
6	5.5	6.3	6.2	5.65	4.95	4.8	4.8
7	5.8	6.3	6.1	5.6	4.9	4.8	4.7
8	6.0	6.25	6.1	5.6	4.95	4.8	4.7
9	6.35	6.35	6.1	5.5	4.95	4.8	4.65
10	6.5	6.55	6.0	5.4	5.0	4.75	4.6
11	6.4	6.6	6.0	5.4	5.0	4.75	4.7
12	6.5	6.6	6.1	5.35	5.0	4.75	4.8
13	6.5	6.7	6.05	5.35	5.1	4.75	4.9
14	6.55	6.6	6.2	5.3	5.1	4.8	5.0
15	6.7	6.6	6.1	5.3	5.1	4.9	5.1
16	6.75	6.55	6.0	5.35	5.1	5.0	5.2
17	6.85	6.55	6.0	5.25	5.1	5.1	5.25
18	6.8	6.5	5.95	5.35	5.1	5.2	5.25
19	6.8	6.4	5.9	5.3	5.0	5.3	5.25
20	6.75	6.45	5.9	5.3	5.0	5.3	5.25
21	6.8	6.4	5.9	5.25	5.0	5.3	5.25
22	6.75	6.4	5.95	5.25	5.0	5.25	5.25
23	6.6	6.35	6.0	5.25	5.0	5.25	5.1
24	6.55	6.35	6.1	5.25	5.0	5.2	5.0
25	6.6	6.3	6.2	5.25	4.95	5.2	....
26	6.7	6.3	6.25	5.25	4.95	5.1	....
27	6.7	6.4	6.25	5.25	4.9	5.1	....
28	6.7	6.4	6.2	5.2	4.9	5.1	....
29	6.6	6.4	6.05	5.2	4.9	5.1	....
30	6.6	6.4	5.0	5.1	4.9	5.1	....
31	6.6	....	5.9	5.1	....	5.0	....

Daily discharge, in second-feet, of Swiftcurrent Creek overflow at Babb, Mont., for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		125	116	66	14	10	14
2	39	130	116	62	14	10	12
3	36	120	116	58	14	10	12
4	35	120	112	58	14	9.2	10
5	32	116	107	58	12	9.2	9.2
6	42	107	98	54	12	8.0	8.0
7	66	107	90	50	10	8.0	6.0
8	82	102	90	50	12	8.0	6.0
9	112	112	90	42	12	8.0	5.2
10	125	130	82	35	14	7.0	4.4
11	116	134	82	35	14	7.0	[illegible]
12	125	134	90	32	14	7.0	[illegible]
13	125	144	86	32	18	7.0	10
14	130	134	98	28	18	8.0	14
15	144	134	90	28	18	10	15
16	149	130	82	32	18	14	22
17	159	130	82	25	18	18	25
18	154	125	78	32	18	22	25
19	154	116	74	28	14	28	25
20	140	120	74	28	14	28	25
21	154	116	74	25	14	28	25
22	140	116	78	25	14	25	25
23	134	112	82	25	14	25	13
24	130	112	90	25	14	22	14
25	134	107	98	25	12	22	
26	144	107	102	25	12	18	
27	144	116	102	25	10	18	
28	144	116	98	22	10	18	
29	134	116	86	22	10	18	
30	134	116	82	18	10	18	
31	134		74	18		14	

NOTE.—Daily discharge determined from a rating curve well defined above 20 second-feet and fairly well defined below. Discharge estimated for July 30 as gage height is believed to be in error.

Combined daily discharge, in second-feet, of St. Mary River and Swiftcurrent Creek overflow at Babb, Mont., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		91	104	525	2,080	2,000	1,250	461	334	361	305
2		91	113	601	2,090	2,000	1,320	489	312	359	305
3		91	134	598	2,000	2,000	1,160	461	312	359	305
4		91	203	597	1,920	1,910	1,090	461	311	357	285
5		91	167	625	1,900	1,830	1,020	433	311	356	285
6	118	91	184	635	1,870	1,740	1,050	433	289	332	285
7	118	91	184	754	1,850	1,730	976	457	289	330	242
8	118	91	234	904	1,820	1,650	1,010	459	310	308	242
9	113	91	276	1,140	1,910	1,570	933	487	289	307	242
10	113	86	307	1,300	1,930	1,480	823	489	267	306	242
11	104	86	367	1,300	2,090	1,410	857	489	247	308	242
12	104	80	372	1,380	2,170	1,350	753	517	247	332	203
13	96	73	372	1,460	2,180	1,350	720	521	267	357	203
14	91	68	382	1,530	2,250	1,280	716	550	248	385	203
15	91	64	382	1,700	2,250	1,270	784	521	291	389	167
16	91	64	398	1,990	2,170	1,260	688	521	316	393	167
17	91	64	409	2,120	2,090	1,180	649	521	342	420	167
18	91	64	420	2,110	2,000	1,180	625	493	369	396	167
19	91	64	437	2,190	1,920	1,170	652	489	423	396	150
20	91	64	454	2,270	1,920	1,170	621	461	399	396	150
21	91	64	465	2,270	1,920	1,170	618	461	399	372	150
22	91	64	465	2,270	1,920	1,260	587	489	420	372	150
23	91	64	495	2,170	1,910	1,260	618	435	420	365	150
24	91	64	525	2,090	1,910	1,350	618	461	417	361	150
25	91	64	525	2,000	1,910	1,430	618	483	393	356	150
26	91	68	557	2,100	1,910	1,430	587	359	365	332	134
27	91	68	557	2,100	1,920	1,430	557	357	365	332	134
28	91	68	557	2,100	1,920	1,430	554	357	413	332	134
29	91	73	557	2,090	2,000	1,420	525	357	389	307	134
30		80	557	2,090	2,000	1,340	521	346	389	307	118
31		80		2,090		1,330	521		385		118

Combined monthly discharge of St. Mary River and Swiftcurrent Creek overflow at Babb, Mont., for 1912.

[Drainage area, 298 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	....	....	98.4	0.330	0.38	6,050	D.
February	118	....	99.7	.335	.36	5,730	C.
March	91	64	75.9	.255	.29	4,670	B.
April	557	104	374	1.26	1.41	22,300	B.
May	2,270	525	1,590	5.34	6.16	97,800	A.
June	2,250	1,820	1,990	6.68	7.45	118,000	A.
July	2,000	1,170	1,460	4.90	5.65	89,800	A.
August	1,320	521	775	2.60	3.00	47,700	A.
September	550	346	461	1.55	1.73	27,400	A.
October	423	247	340	1.14	1.31	20,900	A.
November	420	306	353	1.18	1.32	21,000	B.
December	307	118	196	.658	.76	12,100	B.
The year	2,270	64	653	2.19	29.82	473,000	

NOTE.—Mean discharge Jan. 1 to 12 estimated at 80 second-feet; mean discharge Jan. 13 to Feb. 5 estimated at 110 second-feet.

ST. MARY RIVER NEAR CARDSTON, ALBERTA.

Location.—At Henry Cook's ranch, about half a mile north of the boundary line between the United States and Canada, about a mile below the mouth of Boundary Creek, and about 17 miles southeast of Cardston.

Records available.—September 4, 1902, to December 31, 1912.

Drainage area.—452 square miles.

Gage.—The gage installed when the station was established was destroyed during the high water of June, 1908, and a new chain gage was installed July 19, 1908, about one-fourth mile downstream. No determined relation between the two gages.

Channel.—Shifting.

Discharge measurements.—Made from a cable one-fourth mile above the gage.

Floods.—The flood of June 5, 1908, reached a gage height of about 12.75 feet above the old gage datum.

Winter flow.—Gage heights are affected by ice during the winter.

Accuracy.—Conditions in the channel remained fairly permanent during 1912, and records are good.

Discharge measurements of St. Mary River near Cardston, Alberta, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 30	W. A. Lamb	1.80	675	Aug. 16	W. A. Lamb	2.00	786
June 7	.....do	3.45	1,870	Sept. 19	.....do	1.40	529
30	R. R. Randell	3.80	2,090				

Daily gage height, in feet, of St. Mary River near Cardston, Alberta, for 1912.

[Mrs. H. F. Cook, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			2.0	2.0	4.1	3.8	2.6	1.5	1.0	1.15	0.9
2		2.0		2.0	3.9	3.7		1.5	1.0		.9
3			1.05	2.0	3.8	3.5	2.7	1.5	1.0		.8
4		2.0	1.05	2.0	3.8	3.4	2.6	1.4	1.0	1.15	.8
5			1.05	2.0	3.7		2.6	1.4	1.0	1.15	.75
6		1.4	1.0	2.0	3.6	3.2	2.6	1.4	.95	1.1	
7			1.0	2.0	3.4	3.2	2.6	1.4	.95	1.1	.7
8		1.4	1.0	2.2	3.6	3.2	2.5	1.5	.95	1.1	.7
9		1.5	1.0	2.3	3.8	3.2	2.4	1.5		1.1	.7
10		1.5	1.15	2.5	4.0	3.1	2.4		1.0	1.15	
11	1.0		1.2	2.7	4.2	3.1	2.3		1.0	1.2	
12		1.65	1.3	3.0		3.1			1.0	1.2	.65
13	1.0			3.1	4.4	3.1	2.2	1.6	1.0		
14			1.6	3.2	4.6	3.1	2.0	1.6	1.0		.65
15	1.2	1.7		3.5	4.5	3.1		1.6	1.0		.6
16		1.7	1.3	4.0	4.5	3.0	2.0	1.6	1.1	1.4	.6
17	1.2	1.85	1.5	4.5		2.9	2.0	1.5	1.2	1.3	.6
18		1.9		4.5	3.9	2.8	2.0	1.4	1.2	1.2	.6
19	1.2		1.75	4.5	3.8	2.8	2.0	1.4		1.2	.6
20		1.8	1.75	4.8		2.8	2.0	1.4		1.15	.65
21	1.4		1.75	5.2		2.9	2.0	1.4	1.3	1.15	
22		1.65	1.75	5.2	4.0	3.4	1.9	1.3	1.3	1.1	.6
23	1.4		1.75	4.8	4.0	3.4	1.9	1.3	1.35	1.05	.55
24		3.0	1.75	4.7	4.1		1.9	1.25	1.2		.5
25	2.0	3.0	1.85	4.5	4.2		1.8	1.2	1.2	1.0	.5
26		3.0	1.85	4.5	4.15		1.7	1.2	1.2	1.0	
27	2.0	3.0	1.85	4.6	4.1	2.9	1.7	1.15		1.0	.5
28	2.0	2.0	1.85	4.8		2.8	1.65	1.1		1.0	
29	2.0		1.85	4.6		2.8	1.6	1.1	1.2	1.0	
30		2.0	1.9	4.3	3.8	2.6	1.5	1.05	1.2		.5
31		2.0				2.6	1.5		1.2		.5

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 2 and probably also Dec. 12 to 31.

Daily discharge, in second-feet, of St. Mary River near Cardston, Alberta, for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	150	801	2,430	2,160	1,190	561	388	436	359
2	200	801	2,250	2,070	1,220	561	388	436	359
3	404	801	2,160	1,900	1,260	561	388	436	331
4	404	801	2,160	1,820	1,190	522	388	436	331
5	404	801	2,070	1,740	1,190	522	388	436	318
6	388	801	1,980	1,650	1,190	522	374	419	311
7	388	801	1,820	1,650	1,190	522	374	419	304
8	388	918	1,980	1,650	1,120	561	374	419	304
9	388	982	2,160	1,650	1,050	561	381	419	304
10	436	1,120	2,340	1,570	1,050	571	388	436	300
11	452	1,260	2,520	1,570	982	582	388	452	296
12	486	1,490	2,610	1,570	950	593	388	452	
13	545	1,570	2,700	1,570	918	604	388	470	
14	604	1,650	2,900	1,570	801	604	388	487	
15	545	1,900	2,800	1,570	801	604	388	504	
16	486	2,340	2,800	1,490	801	604	419	522	
17	561	2,800	2,520	1,420	801	561	452	486	
18	618	2,800	2,250	1,340	801	522	452	452	
19	674	2,800	2,160	1,340	801	522	463	452	
20	674	3,080	2,220	1,340	801	522	475	436	
21	674	3,480	2,280	1,420	801	522	486	436	
22	674	3,480	2,340	1,820	748	486	486	419	
23	674	3,080	2,340	1,820	748	486	504	404	
24	674	2,990	2,430	1,720	748	469	452	396	
25	723	2,800	2,520	1,620	698	452	452	388	
26	723	2,800	2,480	1,520	650	452	452	388	
27	723	2,900	2,430	1,420	650	436	452	388	
28	723	3,080	2,340	1,340	627	419	452	388	
29	723	2,900	2,250	1,340	604	419	452	388	
30	748	2,610	2,160	1,190	561	404	452	374	
31		2,520		1,190	561		452		

NOTE.—Daily discharge determined from a rating curve well defined below 3,000 second-feet. Discharge Apr. 1 to 2 and Dec. 11–12 estimated. Discharges interpolated for days of no gage height between Apr. 13 and Dec. 6. Mean discharge Dec. 12 to 31 estimated because of belief that gage heights were affected by ice.

Monthly discharge of St. Mary River near Cardston, Alberta, for 1912.

[Drainage area, 452 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January			[a]130	0.288	0.33	7,990
February			[a]120	.265	.29	6,900
March			[a]110	.243	.28	6,760
April	748	150	542	1.20	1.34	32,300
May	3,480	801	2,030	4.49	5.18	125,000
June	2,900	1,820	2,350	5.20	5.80	140,000
July	2,160	1,190	1,580	3.50	4.04	97,200
August	1,260	561	887	1.96	2.26	54,500
September	604	404	524	1.16	1.29	31,200
October	504	374	423	.936	1.08	26,000
November	522	374	432	.956	1.07	25,700
December	359		249	.551	.64	15,300
The year	3,480		783	1.73	23.60	569,000

[a] Estimated by comparison with other stations on St. Mary River.

NOTE.—Mean discharge Dec. 12 to 31 estimated at 210 second-feet.

SWIFTCURRENT CREEK AT McDERMOTT LAKE, MONT.

Location.—In sec. 12, T. 35 N., R. 16 W., at the outlet of McDermott Lake, about 14 miles southwest of Babb, Mont.

Records available.—June 6 to November 8, 1912.

Drainage area.—31.4 square miles.

Gage.—Vertical staff attached to post on left bank at the lake outlet.

Channel.—Practically permanent. The control is a limestone reef at the lake outlet.

Discharge measurements.—Made by wading or from a cable across the outlet.

Winter flow.—Station not maintained during winter. Ice exists at the gage but control section probably remains unobstructed.

Accuracy.—A curve well defined below 500 second-feet was developed for 1912. Gage heights during low water may be affected by wind action on the lake and therefore may not represent the mean flow for the day.

Discharge measurements of Swiftcurrent Creek at McDermott Lake, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 6	W. A. Lamb	2.53	280
Aug. 8	do	2.06	117
Dec. 15[a]	do	1.39	26

[a] Ice at gage and along edges at measuring section. Control not obstructed.

Daily gage height, in feet, of Swiftcurrent Creek at McDermott Lake, Mont., for 1912.

[G. L. Roberts, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	2.7	2.2	2.0	1.8	1.8	16	2.65	2.3	2.1	1.9	1.8	......
2	......	2.6	2.2	2.0	1.8	1.8	17	2.6	2.3	2.1	1.9	1.8	......
3	......	2.6	2.1	2.0	1.8	1.8	18	2.6	2.3	2.1	1.9	1.8	......
4	......	2.5	2.1	2.0	1.8	1.8	19	2.7	2.3	2.1	1.9	1.8	......
5	......	2.5	2.1	2.0	1.8	1.8	20	2.8	2.5	2.1	1.9	1.8	......
6	2.53	2.5	2.1	2.0	1.8	1.8	21	2.8	2.7	2.1	1.8	1.8	......
7	2.5	2.4	2.1	2.0	1.8	1.8	22	2.9	2.6	2.1	1.8	1.8	......
8	2.7	2.4	2.1	2.0	1.8	1.8	23	2.9	2.5	2.1	1.8	1.8	......
9	2.9	2.4	2.1	2.0	1.9	......	24	3.1	2.4	2.1	1.8	1.8	......
10	3.0	2.4	2.1	2.0	1.9	......	25	2.9	2.3	2.1	1.8	1.8	......
11	2.9	2.4	2.1	2.0	1.8	......	26	2.8	2.3	2.1	1.8	1.8	......
12	3.2	2.4	2.1	2.0	1.8	......	27	2.7	2.3	2.1	1.8	......	......
13	3.0	2.3	2.1	2.0	1.8	......	28	2.6	2.3	2.1	1.8	......	......
14	3.0	2.3	2.1	2.0	1.8	......	29	2.6	2.3	2.0	1.8	......	......
15	2.85	2.3	2.1	1.9	1.8	......	30	2.8	2.2	2.0	1.8	......	......
							31	......	2.2	2.0	......	......	......

NOTE.—Gage heights at low stages may be affected by wind action on the lake and therefore may not represent the mean flow for the day.

Daily discharge, in second-feet, of Swiftcurrent Creek at McDermott Lake, Mont., for 1912.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	364	155	103	68	68	16	338	188	127	84	68	......
2	......	312	155	103	68	68	17	312	188	127	84	68	......
3	......	312	127	103	68	68	18	312	188	127	84	68	......
4	......	266	127	103	68	68	19	364	188	127	84	68	......
5	......	266	127	103	68	68	20	422	266	127	84	68	......
6	280	266	127	103	68	68	21	422	364	127	68	68	......
7	266	225	127	103	68	68	22	485	312	127	68	68	......
8	364	225	127	103	68	68	23	485	266	127	68	68	......
9	485	225	127	103	84	......	24	628	225	127	68	68	......
10	554	225	127	103	84	......	25	485	188	127	68	68	......
11	485	225	127	103	68	......	26	422	188	127	68	68	......
12	706	225	127	103	68	......	27	364	188	127	68	68	......
13	554	188	127	103	68	......	28	312	188	127	68	68	......
14	554	188	127	103	68	......	29	312	188	103	68	68	......
15	454	188	127	84	68	......	30	422	155	103	68	68	......
							31	......	155	103	......	68	......

NOTE.—Daily discharge determined from a rating curve well defined below 500 second-feet.

Monthly discharge of Swiftcurrent Creek at McDermott Lake, Mont., for 1912.

[Drainage area, 31.4 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
June 6-30	706	266	431	13.7	12.75	21,400	A.
July	364	155	230	7.32	8.44	14,100	A.
August	155	103	126	4.01	4.62	7,750	A.
September	103	68	87.5	2.79	3.11	5,210	B.
October	84	68	69.0	2.20	2.54	4,240	B.
November 1-8	68	68	68.0	2.17	.65	1,080	B.
The period	....	....	....	....	....	53,800	

SWIFTCURRENT CREEK AT SHERBURNE LAKE, MONT.

Location.—In sec. 35, T. 36 N., R. 15 W., at the outlet of lower Sherburne Lake, just above the boundary line between Glacier National Park and Blackfeet Indian Reservation.

Records available.—July 1 to December 15, 1912.

Drainage area.—64.0 square miles.

Gage.—Vertical staff on left bank near the outlet of the lake.

Channel.—Apparently permanent.

Discharge measurements.—By wading or from a cable located below the gage.

Winter flow.—Affected by ice.

Diversion.—No artificial storage or diversion above the station.

Accuracy.—A rating table well defined between 90 and 500 second-feet has been developed. Accuracy of gage heights may be affected by wave action on the lake.

Discharge measurements of Swiftcurrent Creek at Sherburne Lake, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 1	R. R. Randell	4.42	453	Sept. 18	W. A. Lamb	[a] 2.7	103
Aug. 15	W. A. Lamb	3.10	151	Dec. 15[b]	.....do	2.53	47

[a] Gage height approximate because of waves.

[b] Frozen over. Gage height affected.

Daily gage height, in feet, of Swiftcurrent Creek at Sherburne Lake, Mont., for 1912.

[F. M. Stevenson, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.4	3.7	2.85	2.44	2.39	2.30	16	3.85	3.15	2.95	2.39	2.7	......
2	4.4	3.65	3.0	2.40	2.32	2.33	17	3.8	3.2	2.8	2.5	2.55	......
3	4.25	3.65	3.0	2.32	2.26	2.36	18	3.65	3.2	2.6	2.85	2.44	......
4	4.05	3.7	3.0	2.35	2.20	2.40	19	3.45	3.1	2.6	3.0	2.5	......
5	4.05	3.7	2.95	2.36	2.26	2.5	20	3.9	3.0	2.7	3.0	2.7	......
6	4.05	3.5	2.9	2.40	2.28	2.6	21	4.5	3.0	2.7	3.05	2.9	......
7	3.95	3.35	2.9	2.42	2.32	2.7	22	4.8	3.05	2.6	2.95	2.8	......
8	3.85	3.3	2.9	2.38	2.45	2.7	23	4.8	3.15	2.6	3.05	2.6	......
9	3.85	3.25	3.05	2.40	2.7	2.75	24	5.1	3.2	2.6	2.85	2.49	......
10	3.8	3.25	3.2	2.40	2.95	2.75	25	4.8	3.2	2.5	2.8	2.65	......
11	3.85	3.25	3.25	2.38	2.95	2.8	26	4.4	3.2	2.5	2.6	2.55	......
12	4.05	3.2	3.25	2.36	2.8	......	27	4.15	3.1	2.5	2.55	2.41	......
13	4.05	3.15	3.2	2.34	2.85	......	28	4.0	3.0	2.5	2.6	2.38	......
14	4.1	3.15	3.25	2.26	2.8	......	29	3.9	2.9	2.5	2.7	2.32	......
15	3.95	3.1	3.1	2.28	2.8	2.55	30	3.85	2.9	2.45	2.6	2.28	......
							31	3.75	2.65	......	2.55	......	......

NOTE.—Gage heights after Dec. 1 affected by ice.

Daily discharge, in second-feet, of Swiftcurrent Creek at Sherburne Lake, Mont., for 1912.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	449	266	120	80	76	71	16	302	158	132	76	103	......
2	449	254	138	77	72	70	17	290	166	114	86	88	......
3	407	254	138	72	69	69	18	254	166	93	120	80	......
4	353	266	138	74	66	68	19	212	151	93	138	84	......
5	353	266	132	75	69	67	20	315	138	103	138	103	......
6	353	222	126	77	70	66	21	478	138	103	144	126	......
7	328	192	126	78	72	65	22	571	144	93	132	114	......
8	302	183	126	76	80	64	23	571	158	93	144	93	......
9	302	174	144	77	103	63	24	672	166	93	120	83	......
10	290	174	166	77	132	62	25	571	166	84	114	98	......
11	302	174	174	76	132	59	26	449	166	84	93	88	......
12	353	166	174	75	114	56	27	380	151	84	88	78	......
13	353	158	166	73	120	53	28	340	138	84	93	76	......
14	366	158	174	69	114	50	29	315	126	84	103	72	......
15	328	151	151	70	114	47	30	302	126	80	93	70	......
							31	278	98	......	88	......	......

NOTE.—Daily discharge determined from a rating curve well defined between 90 and 500 second-feet. Discharge Dec. 2 to 15 estimated from measurement Dec. 15.

Monthly discharge of Swiftcurrent Creek at Sherburne Lake, Mont., for 1912.

[Drainage area, 64 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
July	672	212	374	5.84	6.73	23,000	A.
August	266	98	175	2.74	3.16	10,800	A.
September	174	80	120	1.88	2.10	7,140	A.
October	144	69	93.4	1.46	1.68	5,740	B.
November	132	66	91.9	1.44	1.61	5,470	B.
December 1-15	71	47	62.0	.969	.54	1,840	C.
The period						54,000	

OTTERTAIL RIVER NEAR FERGUS FALLS, MINN.

Location.—At Three-mile Bridge, 3½ miles northeast of Fergus Falls, between secs. 18 and 19, T. 133 N., R. 42 W., several miles above the outlet of Wall Lake, and 20 miles below Ottertail Lake, through which the river flows.

Records available.—May 9, 1904, to December 31, 1912. A gaging station was maintained from May 1, 1899, to May 14, 1904, by the Engineer Corps, United States Army, at the outlet of Ottertail Lake, where the drainage area is about 12 per cent less than at the Geological Survey station, with no important tributaries intervening. The observations at Fergus Falls in connection with those at the outlet of Ottertail Lake furnish a 13-year record of flow of the river below Ottertail Lake.

Drainage area.—1,310 square miles.

Gage.—Chain attached to the bridge; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Discharge measurements are made from the bridge except at extreme low stages, when they are made at a wading section.

Winter flow.—The river is frozen over from December to March and measurements are made to determine the winter flow.

Artificial control.—Ottertail Lake, about 22 square miles in area, forms a natural reservoir which regulates the flow of the river to such an extent that the recorded range of stage has not exceeded 2 feet. On the upper part of the river are a number of dams used in driving logs to the sawmill at Frazee, where the lowest dam is built. The next dam below Frazee is at Maine, several miles below Ottertail Lake, about sec. 35, T. 134 N., R. 41 W. During the low-water season the closing of the turbine gates at Maine may have an effect on the flow immediately below the dam. Small lakes through which the river flows before reaching the gaging station tend to equalize the flow at the latter point. Below the station there are a number of power plants, but owing to the fall of the river their influence is not observable at the gage.

Discharge measurements of Ottertail River near Fergus Falls, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec. ft.*			*Feet.*	*Sec. ft.*
Jan. 25[a]	S. B. Soulé	3.75	60	Aug. 11[c]	W. G. Hoyt	2.78	221
Feb. 29[b]	do	3.69	72	Dec. 17[d]	S. B. Soulé	3.23	152
May 7	W. G. Hoyt	2.95	301				

[a] Complete ice cover; average thickness of ice, 1.79 feet; average distance from water surface to top of ice, 0.06 foot.

[b] Complete ice cover; average thickness of ice, 2.14 feet; average distance water surface to top of ice, 0.29 foot.

[c] Measurement made by wading at section above gage.

[d] Complete ice cover at measuring section and at gage; average thickness of ice, 0.81 foot; average distance from water surface to top of ice, 0.05 foot. Partly open at controlling section.

Daily gage height, in feet, of Ottertail River near Fergus Falls, Minn., for 1912.

[H. G. Evensen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	3.75		3.9	2.8	3.05	2.9	2.65	2.6	2.7	2.7	2.8
2			3.8	3.9	2.8	3.05	3.0	2.65	2.7	2.7	2.7	2.8
3				3.6	2.9	3.05	2.95	2.75	2.7	2.7	2.7	2.9
4				3.5	3.0	3.05	2.85	2.65	2.7	2.7	2.7	
5			3.85	2.8	3.05	3.05	2.95	2.85	2.7	2.7	2.65	
6	3.3	3.8		2.7	3.0	3.05	2.95	2.75	2.7	2.7	2.65	
7				2.7	3.0	3.05	2.85	2.9	2.7	2.65	2.65	
8	3.4		3.9	2.65	2.95	3.05	3.2	2.85	2.7	2.65	2.7	
9		3.8		2.6	2.95	3.05	3.15	2.9	2.7	2.7	2.6	
10				2.5	2.85	2.95	3.0	2.8	2.6	2.6	2.7	2.85
11				2.6	2.95	3.0	3.05	2.8	2.75	2.7	2.7	
12	3.4		3.85	2.55	2.95	3.0	3.0	2.8	2.75	2.7	2.7	
13		4.0		2.55	2.9	3.0	2.9	2.85	2.75	2.7	2.7	
14				2.6	2.9	3.0	3.0	2.85	2.75	2.7	2.7	
15	3.35			2.6	2.9	3.05	2.95	2.8	2.75	2.7	2.7	
16			4.0	2.65	2.9	3.05	2.95	2.8	2.75	2.65	2.7	
17		4.1		2.65	2.9	3.05	2.85	2.8	2.7	2.65	2.7	3.25
18				2.7	2.9	3.05	2.95	2.8	2.7	2.65	2.7	
19			4.4	2.7	2.9	3.05	2.9	2.75	2.65	2.65	2.7	3.3
20	3.6	4.0		2.6	2.7	2.95	2.8	2.65	2.55	2.65	2.6	
21				2.7	2.95	3.05	2.9	2.7	2.65	2.65	2.75	
22	3.7			2.7	2.95	3.05	2.9	2.7	2.65	2.65	2.75	
23			4.4	2.7	2.95	3.05	2.75	2.65	2.7	2.65	2.75	
24		4.1		2.75	2.95	3.05	2.85	2.65	2.7	2.7	2.75	
25	3.75			2.8	2.9	3.0	2.85	2.65	2.8	2.7	2.75	
26			4.2	2.8	2.9	3.0	2.85	2.65	2.8	2.7	2.7	3.4
27		3.95		2.8	3.0	3.0	2.75	2.65	2.75	2.7	2.7	
28				2.8	3.0	3.0	2.85	2.65	2.75	2.7	2.8	
29	3.7	3.7		2.8	3.0	3.0	2.8	2.65	2.75	2.7	2.7	
30			3.85	2.7	2.9	2.9	2.7	2.7	2.75	2.6	2.8	
31					2.95		2.75	2.7		2.7		

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 5, and about Nov. 30 to Dec. 31.

Daily discharge, in second-feet, of Ottertail River near Fergus Falls, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	236	336	274	184	168	201	201
2	....	236	336	315	184	201	201	201
3	....	274	336	294	218	201	201	201
4	....	315	336	255	184	201	201	201
5	....	336	336	294	255	201	201	184
6	201	315	336	294	218	201	201	184
7	201	315	336	255	274	201	184	184
8	184	294	336	402	255	201	184	201
9	168	294	336	380	274	201	201	168
10	138	255	294	315	236	168	168	201
11	168	294	315	336	236	218	201	201
12	153	294	315	315	236	218	201	201
13	153	274	315	274	255	218	201	201
14	168	274	315	315	255	218	201	201
15	168	274	336	294	236	218	201	201
16	184	274	336	294	236	218	184	201
17	184	274	336	255	236	201	184	201
18	201	274	336	294	236	201	184	201
19	201	274	336	274	218	184	184	201
20	168	201	294	236	184	153	184	168
21	201	294	336	274	201	184	184	218
22	201	294	336	274	201	184	184	218
23	201	294	336	218	184	201	184	218
24	218	294	336	255	184	201	201	218
25	236	274	315	255	184	236	201	218
26	236	274	315	255	184	236	201	201
27	236	315	315	218	184	218	201	201
28	236	315	315	255	184	218	201	236
29	236	315	315	236	184	218	201	201
30	201	274	274	201	201	218	168	....
31	....	294	....	218	201	....	201	....

NOTE.—Daily discharge computed from a well-defined rating curve. Discharge Jan. 1 to Apr. 5 and Nov. 30 to Dec. 31, 1912, estimated, because of ice, from discharge measurements, observer's records, and climatologic records as follows: Jan. 1–31, 80 second-feet, varying from about 90 to 60 second-feet; Feb. 1–29, 70 second-feet; Mar. 1–31, 70 second-feet; Apr. 1–5, 120 second-feet, varying from about 90 to 160 second-feet; Nov. 30, 200 second-feet; Dec. 1–31, 164 second-feet, varying from about 200 to 128 second-feet.

Monthly discharge of Ottertail River near Fergus Falls, Minn., for 1912.

[Drainage area, 1,310 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	....	....	80	0.061	0.07	4,920	C.
February	....	....	70	.053	.06	4,030	B.
March	....	....	70	.053	.06	4,300	C.
April	236	138	181	.138	.15	10,800	B.
May	336	201	284	.217	.25	17,500	A.
June	336	274	325	.248	.28	19,300	A.
July	402	201	278	.212	.24	17,100	A.
August	274	184	216	.165	.19	13,300	A.
September	236	153	204	.156	.17	12,100	A.
October	201	168	193	.147	.17	11,900	A.
November	236	168	201	.153	.17	12,000	A.
December	....	....	164	.125	.14	10,100	B.
The year	....	....	189	.144	1.95	137,000	

RED RIVER AT FARGO, N. DAK.

Location.—At the highway bridge connecting Front Street, Fargo, N. Dak., with Moorhead, Minn., 10 miles above the mouth of Sheyenne River.

Records available.—May 27, 1901, to December 31, 1912.

Drainage area.—6,020 square miles.

Gage.—Vertical staff attached to the breakwater for the center pier of the Front Street Bridge; read from the bridge or the river banks by the aid of a field glass; datum unchanged since establishment.

Channel.—Clay and silt; slightly shifting.

Discharge measurements.—From the Front Street Bridge and the Northern Pacific Railway bridge.

Artificial control.—There is a low dam of steel sheet piling a few rods below the footbridge at Fargo Waterworks, one-half mile above the gage. This dam, a tight overflow weir without sluices, was built in August, 1910, for the purpose of maintaining a sufficient depth of water for the intake pipe of the waterworks, and raises the water about 5 feet at lowest stage. Conditions of flow at the gage are not affected by this dam.

Winter flow.—The relation of gage height to discharge is affected by ice from about the middle of November to the first of April, and during this time observations are discontinued. At the spring break-up, on account of the comparatively sluggish current and the fact that the river flows northward into a colder district, a pronounced backwater effect is usually caused by ice jams and partial ice jams.

Accuracy.—Because of the inaccessibility of the gage, the relatively poor conditions for making accurate discharge measurements, and the slightly shifting channel, the records are not considered better than fair.

Discharge measurements of Red River at Fargo, N. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 25	E. F. Chandler	8.78	576
Aug. 30	do	7.11	179
Oct. 30	W. B. Stevenson	7.53	228

NOTE.—Measurements made from Front Street Bridge.

Daily gage height, in feet, of Red River at Fargo, N. Dak., for 1912.

[E. H. Grasse, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		8.4	8.2	9.0	8.5	7.9	7.3	8.0	7.7	7.1
2		8.5	8.2	8.9	8.4	7.8	7.3	7.9	7.6	7.1
3		8.7	8.3	8.7	8.4	7.6	7.5	7.9	7.7	7.2
4		9.1	8.3	8.6	8.4	7.6	7.5	7.8	7.7	7.2
5		9.4	8.6	8.5	8.4	7.5	7.6	7.7	7.8	7.1
6		9.5	9.0	8.5	8.5	7.3	7.5	7.6	7.7	7.1
7		9.9	9.7	8.5	8.5	7.3	7.4	7.6	7.5	7.1
8		10.4	9.9	8.4	8.4	7.5	7.5	7.7	7.4	
9		10.2	10.2	8.4	8.5	7.6	7.4	7.7	7.5	
10		9.4	10.4	8.5	8.5	7.5	7.4	7.7	7.5	
11		9.0	10.4	8.5	8.7	7.6	7.3	7.6	7.6	
12		8.8	10.4	8.5	8.9	7.8	7.2	7.6	7.6	
13		8.6	10.5	8.6	9.0	8.1	7.2	7.6	7.5	
14		8.4	10.6	8.6	9.1	8.8	7.3	7.6	7.4	
15		8.4	10.4	8.5	8.8	8.7	7.2	7.7	7.3	
16		8.3	10.3	8.4	8.5	8.5	7.2	7.7	7.2	
17		8.2	10.0	8.4	8.5	8.5	7.1	7.7	7.1	
18		8.4	9.8	8.5	8.6	8.5	7.1	7.6	7.1	
19		8.6	9.4	8.5	8.6	8.5	7.2	7.5	7.2	
20		8.8	9.1	8.5	8.5	8.5	7.3	7.5	7.3	

Daily gage height, in feet, of Red River at Fargo, N. Dak., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	....	8.6	8.9	8.6	8.4	8.0	7.4	7.6	7.4	....
22	....	8.4	8.8	9.0	8.4	7.8	7.4	7.6	7.4	....
23	....	8.3	8.8	8.9	8.3	7.6	7.5	7.6	7.4	....
24	....	8.2	8.8	8.8	8.2	7.5	7.6	7.6	7.3	....
25	....	8.2	8.8	8.8	8.1	7.4	7.6	7.5	7.2	....
26	7.3	8.2	8.8	8.7	8.2	7.3	7.7	7.5	7.0	....
27	7.3	8.1	8.8	8.7	8.1	7.2	7.8	7.5	6.9	....
28	7.4	8.2	8.8	8.6	8.0	7.2	7.8	7.5	7.0	....
29	7.4	8.3	8.9	8.6	8.0	7.2	7.9	7.5	7.0	....
30	7.4	8.3	8.9	8.6	7.9	7.3	7.9	7.6	7.1	....
31	7.8	....	8.9	....	7.9	7.3	....	7.6	....	....

NOTE.—Relation of gage height to discharge believed to have been affected by ice from Mar. 26 to 31 and from Nov. 19 to Dec. 7. No records obtained before and after these dates.

Daily discharge, in second-feet, of Red River at Fargo, N. Dak., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	475	426	630	500	355	222	326	261	93
2	....	500	426	603	475	332	220	304	240	78
3	....	551	450	551	475	288	260	304	261	93
4	....	657	450	525	475	288	258	282	261	78
5	....	740	525	500	475	266	277	261	282	64
6	....	768	630	500	500	224	253	240	261	64
7	....	885	826	500	500	224	230	240	220	64
8	....	1,040	885	475	475	266	249	261	200	....
9	....	976	976	475	500	288	226	261	220	....
10	....	740	1,040	500	500	266	224	261	220	....
11	....	630	1,040	500	551	288	202	240	240	....
12	....	577	1,040	500	603	332	181	240	240	....
13	....	525	1,070	526	630	402	179	240	220	....
14	....	475	1,100	525	657	577	196	240	200	....
15	....	475	1,040	500	577	551	175	261	181	....
16	....	450	1,010	475	500	500	173	261	162	....
17	....	426	915	475	500	500	153	261	144	....
18	....	475	855	500	525	500	151	240	144	....
19	....	525	740	500	525	500	168	220	144	....
20	....	577	657	500	500	500	185	220	162	....
21	....	526	603	525	475	378	200	240	162	....
22	....	475	577	630	475	332	200	240	162	....
23	....	450	577	603	450	288	220	240	162	....
24	....	426	577	577	426	266	240	240	144	....
25	....	426	577	577	402	245	240	220	126	....
26	120	426	577	551	426	224	261	220	94	....
27	120	402	577	551	402	204	282	220	78	....
28	140	426	577	525	378	204	282	220	93	....
29	140	450	603	525	378	204	304	220	93	....
30	150	450	603	525	355	224	304	240	93	....
31	230	....	603	....	355	224	....	240	....	....

NOTE.—Discharge determined from two fairly well defined rating curves, applicable from Apr. 1 to Aug. 31, and from Sept. 21 to Nov. 18. Shifting channel methods used from Sept. 1 to 20. Discharge estimated because of ice from Mar. 26 to 31 and from Nov. 19 to Dec. 7.

Monthly discharge of Red River at Fargo, N. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 26-31	230	120	150	1,790	D.
April	1,040	402	564	33,600	B.
May	1,100	426	727	44,700	B.
June	630	475	528	31,400	B.
July	657	355	483	29,700	B.
August	577	204	330	20,300	B.
September	304	151	224	13,300	C.
October	326	220	248	15,200	B.
November	282	78	182	10,800	C.
December 1-7	93	64	76.3	1,060	D.
The period				202,000	

RED RIVER AT GRAND FORKS, N. DAK.

Location.—At the Northern Pacific Railway bridge between Grand Forks, N. Dak., and East Grand Forks, Minn., about half a mile below the mouth of Red Lake River.

Records available.—May 26, 1901, to December 31, 1912. Gage-height records have, however, been kept by the United States Engineer Corps for about 30 years at this point.

Drainage area.—25,000 square miles.

Gages.—Staff and chain, attached to Northern Pacific Railway bridge; datum same for both and unchanged since establishment. As a rule the chain gage is read only during periods of extremely low water. The United States Engineer Corps gage is located on the breakwater to which the United States Geological Survey staff gage is attached, but at a datum 5 feet higher.

Channel.—Clay and silt; shifts slightly.

Discharge measurements.—Made from the Great Northern Railway bridge about one-fifth mile above the gage.

Artificial control.—There are no dams or other obstructions below, nor rapids, the channel being fairly uniform for miles. Above there are no power plants, dams, or reservoirs affecting the flow nearer than Crookston, on Red Lake River, 25 miles above Grand Forks, along the general course of the valley; about half the water comes from Red Lake River, but the storage at the Crookston plant is so small that no fluctuations caused by it have been discovered at Grand Forks. On the other branch, the Red River proper, and its tributaries above Grand Forks, there are no reservoirs or power plants for a hundred miles above.

Winter flow.—The river flows under smooth ice from about the middle of November to the middle of April; the flow during the winter fluctuates little, and since 1895 enough discharge measurements have been made each winter to give fairly satisfactory summaries for the winter.

When the ice breaks up in the spring, because the river has only a gentle current and because it flows north into cooler regions where the river is not yet open, the gage reading is usually excessively and disproportionately high for a few days or weeks, so that the figures for quantity of flow must depend largely on estimation; actual measurements when the river appeared entirely open and clear of ice at this point have sometimes shown the gage reading to be 5 feet greater than would have been needed for the same discharge later in the season, after the whole length of the river was entirely open.

Discharge measurements of Red River at Grand Forks, N. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9	Goric Monley	[a]3.50	175	Nov. 8	W. B. Stevenson	5.12	923
Feb. 12	.....do	[b]3.00	115	12	.....do	5.02	942
May 14	Chandler and Budge	8.72	2,370	Dec. 12	.....do	[c]5.00	473
Oct. 12	Chandler and Stevenson	6.30	1,210				

[a] Mean lower surface of ice equals 2.41 feet on gage.
[b] Mean lower surface of ice equals 1.64 feet on gage.
[c] Mean lower surface of ice equals 4.24 feet on gage.

NOTE.—Discharge relation on Jan. 9, Feb. 12, and Dec. 12 affected by ice. All measurements made at Great Northern Ry. bridge.

Daily gage height, in feet, of Red River at Grand Forks, N. Dak., for 1912.

[J. F. Hayes, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				7.2	5.9	7.0	4.8	4.4	4.0	9.0	5.7	
2			2.9	7.6	5.8	7.0	4.8	4.5	4.4	8.8	5.6	
3		2.7		8.9	5.7	6.9	4.8	5.1	4.0	8.6	5.2	
4				9.8	5.6	6.9	4.6	4.6	3.6	8.3	5.2	
5				10.3	5.8	6.8	4.5	4.1	3.7	7.8	5.2	
6	3.4			11.5	5.8	6.8	4.5	4.2	3.7	7.4	5.1	
7				12.0	6.0	6.7	4.5	4.2	3.8	7.0	5.0	5.2
8				12.6	6.3	6.6	4.6	4.3	3.9	6.8	5.1	
9	3.5		3.3	12.7	6.8	6.4	4.8	4.3	4.0	6.7	5.2	
10		2.6		12.5	7.6	6.1	4.7	4.2	4.0	6.6	5.2	
11				11.8	8.1	6.0	4.5	4.2	3.8	6.4	5.2	
12		3.0		11.3	8.3	5.9	4.6	4.4	3.8	6.3	5.0	5.0
13	3.0			10.6		5.8	4.6	4.2	4.2	6.0	5.0	
14				10.1	8.7	5.6	5.0	4.0	4.0	5.9	4.9	4.8
15				9.7	8.4	5.5	5.0	4.1	4.2	5.8	4.8	
16			3.7	9.1	8.6	5.5	5.0	4.5	4.2	5.6	4.5	
17		2.8	3.7	8.4	8.5	5.5	5.2	5.3	4.0	5.5	4.6	
18			3.6	8.0	8.4	5.8	5.2	4.9	4.1	5.6	4.0	
19			3.8	7.7	8.2	5.6	5.0	4.6	4.4	5.5	4.4	
20	3.0		3.8	7.2	8.0	5.9	5.1	4.5	4.3	5.5	4.6	
21			4.0	7.0	7.8	5.8	5.2	4.3	4.6	5.4	4.5	4.7
22			4.0	7.0	7.8	5.8	5.3	4.5	4.6	5.3	5.2	
23			4.0	6.8	7.6	6.2	5.3	4.7	4.8	5.4	4.8	
24		2.8	4.1	6.6	7.5	6.3	5.2	4.4	5.1	5.6	5.0	
25			4.2	6.4	7.4	6.5	5.0	4.2	5.6	5.7	4.5	
26			4.3	6.2	7.2	6.2	4.8	4.1	5.7	5.7	4.5	
27	2.9		4.4	6.0	7.1	5.5	4.8	4.1	7.3	5.7	5.0	
28			4.8	5.8	7.1	5.2	4.8	4.4	8.0	5.7	4.7	4.6
29			5.2	5.7	7.1	5.0	4.8	4.0	8.6	5.7	4.8	
30			5.6	5.6	7.0	5.0	4.8	3.8	9.2	5.7	4.4	
31			5.7		6.9		4.8	3.8		5.6		

NOTE.—Relation of gage height to discharge affected by ice from Jan. 1 to Mar. 31 and from Nov. 19 to Dec. 31.

Daily discharge, in second-feet, of Red River at Grand Forks, N. Dak., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1,610	1,050	1,520	678	566	470	2,520	1,150
2	1,800	1,010	1,520	678	592	566	2,410	1,120
3	2,470	976	1,480	678	772	470	2,310	974
4	2,960	940	1,480	620	620	385	2,150	974
5	3,240	1,010	1,430	592	493	405	1,900	974
6	3,950	1,010	1,430	592	517	405	1,700	939
7	4,260	1,000	1,390	592	517	426	1,520	905
8	4,640	1,210	1,340	620	541	448	1,430	939
9	4,710	1,430	1,260	678	541	470	1,390	974
10	4,580	1,800	1,130	648	517	470	1,340	974
11	4,140	2,050	1,090	592	517	426	1,260	974
12	3,830	2,150	1,050	620	566	426	1,210	905
13	3,410	2,260	1,010	620	517	517	1,090	905
14	3,130	2,360	940	740	470	470	1,050	872
15	2,900	2,200	905	740	493	517	1,010	840
16	2,570	2,310	905	740	592	517	940	750
17	2,200	2,250	905	804	837	470	905	779
18	2,000	2,200	1,010	804	708	493	940	615
19	1,850	2,100	940	740	620	566	905	....
20	1,610	2,000	1,050	772	592	541	905	....
21	1,520	1,900	1,010	804	541	620	885	....
22	1,520	1,900	1,010	837	592	620	864	....
23	1,430	1,800	1,170	837	648	678	912	....
24	1,340	1,750	1,210	804	566	772	998	....
25	1,260	1,700	1,300	740	517	940	1,050	....
26	1,170	1,610	1,170	678	493	976	1,070	....
27	1,000	1,570	905	678	493	1,660	1,080	....
28	1,010	1,570	804	678	566	2,000	1,100	....
29	976	1,570	740	678	470	2,310	1,110	....
30	940	1,520	740	678	426	2,630	1,130	....
31	....	1,480	....	678	426	....	1,110	....

NOTE.—Discharge determined from two curves, the first applicable from Apr. 1 to Oct. 20, and well defined above 1,000 second-feet and fairly well defined between 600 and 1,000 second-feet; the second applicable from Nov. 1 to 18 and well defined above 800 second-feet. Shifting-channel method used from Oct. 21 to 31. Mean discharge for periods affected by ice estimated from discharge measurements, observer's notes, and weather reports. Mean discharge from Nov. 19 to 30 estimated at 650 second-feet.

Monthly discharge of Red River at Grand Forks, N. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	....	....	140	8,610	D.
February	....	....	110	6,330	D.
March	....	....	300	18,400	D.
April	4,710	940	2,470	147,000	B.
May	2,360	940	1,670	103,000	A.
June	1,520	740	1,130	67,200	A.
July	837	592	698	42,900	B.
August	837	426	559	34,400	C.
September	2,630	385	755	44,900	C.
October	2,520	864	1,300	79,900	B.
November	1,150	....	812	48,300	B.
December	....	....	422	25,900	C.
The year	4,710	....	863	627,000	

NOTE.—See footnote to table of daily discharge.

PELICAN RIVER NEAR FERGUS FALLS, MINN.

Location.—At the private highway bridge 6 miles northwest of Fergus Falls, in sec. 18, T. 134 N., R. 42 W., about 5 miles above junction with Red River.

Records available.—June 19, 1909, to December 31, 1912.

Drainage area.—433 square miles.

Gage.—Vertical staff; datum unchanged. Gage is read twice a day and the mean of the readings is recorded as the mean for the day.

Channel.—Apparently permanent, but measurements made in 1912 indicate that the channel will shift during times of high stage. At low stages the channel is probably permanent.

Winter flow.—Discharge measurements are made to determine the flow from the middle of November to the first of April, when ice is present.

Artificial control.—The nearest dam is at Elizabeth, 6 to 8 miles above; the intermittent operation of the mill at Elizabeth causes a slight daily fluctuation in gage heights.

Accuracy.—Conditions of flow are excellent, except for fluctuations caused by operation of mill at Elizabeth. Backwater from Red River does not extend to station, as the range in stage of that stream is small.

Discharge measurements of Pelican River near Fergus Falls, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 7	W. G. Hoyt	6.31	125	Aug. 11[a]	W. G. Hoyt	6.09	69
Do	S. B. Soulé	6.31	119	Do[a]	do	6.09	70

[a] Wading measurement.

Daily gage height, in feet, of Pelican River near Fergus Falls, Minn., for 1912.

[Henry W. Luther, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			6.1		6.34	6.60	5.90	5.95	5.70	6.11	5.95
2	5.7	5.3		7.2	6.39	6.50	5.90	5.88	5.70	6.30	5.96
3					6.50	6.44	5.90	5.62	5.86	5.75	5.58
4	5.8			6.8	6.49	6.34	5.86	5.60	5.70	5.60	5.85
5			6.2	6.45	6.49	6.30	5.90	5.90	5.94	5.90	5.90
6		5.4		6.10	6.50	6.28	5.90	5.90	5.90	5.60	5.98
7				6.22	6.50	6.22	5.90	6.00	5.85	6.05	5.96
8			5.7	6.20	6.50	6.20	5.90	6.31	5.60	6.10	5.95
9	6.0	6.2		6.05	6.50	6.20	5.86	6.40	5.60	5.99	5.92
10				6.00	6.50	6.20	5.90	6.25	5.80	5.99	5.60
11				6.05	6.49	6.20	5.90	6.11	5.80	5.98	5.90
12	6.1		5.6	6.10	6.50	6.20	5.85	6.02	5.80	5.91	5.92
13		5.6		6.10	6.49	6.15	5.90	5.91	5.80	5.58	5.95
14				5.98	6.50	6.38	5.90	5.88	5.80	5.88	5.96
15			5.8	6.05	6.50	6.48	6.05	5.80	5.60	5.91	5.99
16	5.4	7.4		6.11	6.50	6.42	5.89	5.78	5.95	5.90	5.95
17				6.00	6.50	6.40	5.60	5.76	5.95	5.92	5.98
18				6.06	6.50	6.30	5.60	5.70	5.95	5.94	5.90
19	5.5		7.2	6.05	6.50	6.30	6.00	5.70	5.98	5.92	5.94
20		7.6		6.06	6.55	6.26	5.69	5.80	6.00	5.60	5.90
21				6.00	6.60	6.16	5.60	5.76	6.02	5.90	5.92
22			5.9	6.15	6.60	6.08	5.60	5.80	5.61	5.94	6.30
23	5.9	5.7		6.20	6.60	6.00	5.75	5.72	5.60	5.94	6.29
24				6.22	6.60	5.90	5.62	5.70	5.69	6.00	6.41
25				6.18	6.60	5.90	5.72	5.70	6.10	5.99	6.08
26	6.0		7.5	6.14	6.60	5.91	5.68	5.70	6.06	5.96	6.29
27		5.9		6.20	6.65	5.90	5.62	5.70	6.05	5.65	6.35
28				6.11	6.70	5.90	5.60	5.72	5.80	6.02	6.45
29			7.3	6.14	6.70	5.90	5.60	5.75	5.80	5.95	6.55
30	5.8			6.24	6.65	5.80	5.88	6.00	5.80	5.95	6.40
31					6.65		5.92	5.70		5.95	

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 5, and about Nov. 22 to Dec. 31.

Daily discharge, in second-feet, of Pelican River near Fergus Falls, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	126	200	42	49	22	75	49
2	....	139	170	42	40	22	116	50
3	....	170	153	42	16	38	26	13
4	....	167	126	38	14	22	14	36
5	....	167	116	42	42	48	42	42
6	73	170	111	42	42	42	14	50
7	98	170	98	42	56	36	64	50
8	93	170	93	42	119	14	73	49
9	64	170	93	38	142	14	55	45
10	56	170	93	42	104	31	55	14
11	64	167	93	42	75	31	53	42
12	73	170	93	36	59	31	43	45
13	73	167	104	42	43	31	13	49
14	53	170	137	42	40	31	40	49
15	64	170	164	64	31	14	43	55
16	75	170	148	41	29	49	42	49
17	56	170	142	14	27	49	45	53
18	66	170	116	14	22	49	48	42
19	64	170	116	56	22	53	45	48
20	66	185	107	21	31	56	14	42
21	56	200	85	14	27	59	42	45
22	83	200	70	14	31	15	48	....
23	93	200	56	26	24	14	48	....
24	98	200	42	16	22	21	56	....
25	89	200	42	24	22	73	55	....
26	81	200	43	20	22	64	50	....
27	93	215	42	16	22	64	18	....
28	75	230	42	14	24	31	59	....
29	81	230	42	14	26	31	49	....
30	102	215	31	40	56	31	49	....
31	....	215	....	45	22	....	49	....

NOTE.—Daily discharge computed from a rating curve not well defined.

Discharge Jan. 1 to Apr. 5 and Nov. 22 to Dec. 31 estimated, because of ice, from climatologic records, discharge measurements, gage heights, and discharge of adjacent drainage areas, as follows: Jan. 1–31, 2 second-feet, varying from about 5 to 1 second-feet, Feb. 1–29, 2 second-feet; Mar. 1–31, 8 second-feet; Apr. 1–5, 50 second-feet; Nov. 22–30, 40 second-feet; Dec. 1–31, 20 second-feet.

Monthly discharge of Pelican River near Fergus Falls, Minn., for 1912.

[Drainage area, 433 square miles.][a]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	....	....	2.0	
February	....	....	2.0	
March	....	....	8.0	
April	....	....	71.3	C.
May	230	126	182	B.
June	200	31	98.9	B.
July	64	14	33.1	C.
August	142	14	42.0	B.
September	73	14	36.2	C.
October	116	13	46.5	C.
November	....	13	42.6	C.
December	....	....	20	
The year	....	....	48.8	

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[a] "Discharge per square mile" and "run-off (depth in inches on drainage area)" have not been published for this station, because such values are affected by the storage on Melissa Lake for the power plant at Kinsbury Locks and by the diurnal fluctuation of discharge at the gaging station caused by the operation of the plant at Elizabeth, and would therefore be misleading.

NOTE.—See footnotes to table of daily discharge.

WILD RICE RIVER AT TWIN VALLEY, MINN.

Location.—At the highway bridge at Twin Valley, 2 miles above the nearest tributary which enters at Heiberg.

Records available.—June 30, 1909, to December 31, 1912.

Drainage area.—805 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Practically permanent. The river overflows at a stage of 12 feet on the gage and covers an area several hundred feet wide.

Discharge measurements.—Made from the bridge except at extreme low stages, when they are made at a wading section.

Floods.—An exceptionally severe flood occurred in July, 1909, which overflowed the lower part of the valley and wrecked the power dam at Faith by cutting around the end and greatly increasing the width of the channel. The maximum stage of the flood at Twin Valley was 20 feet and the discharge about 9,200 second-feet.

Artificial control.—There is a dam across the river at Heiberg, but the highest point affected by the backwater is more than a mile below Twin Valley. Discharge at the station is affected by the storage created by the dams at the lower end of Lower Rice Lake and at the outlet of Twin Lakes.

Accuracy.—The estimate for the flood discharge in 1911 above stage 14 feet was made by Kutter's formula in connection with the known area of the cross section and may be somewhat in error, but the error probably does not exceed 10 per cent.

Discharge measurements of Wild Rice River at Twin Valley, Minn., for 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 5	Gorie Monley	[a]4.95	10	Sept. 19	E. F. Chandler	5.12	112
Mar. 16	George Ebner	[b]5.55	17	Dec. 24[d]	W. B. Stevenson	5.23	16
17	do	[c]5.55	20				

[a] Complete ice cover.
[b] Complete ice cover; average thickness of ice, 1.87 feet.
[c] Complete ice cover; average thickness of ice, 1.80 feet.
[d] Complete ice cover; average thickness of ice, 0.65 foot.

Daily gage height, in feet, of Wild Rice River at Twin Valley, Minn., for 1912.

[Alex. Johnson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				6.8	5.10	6.0	4.60	4.75	4.60	5.40	5.30	
2		4.95		6.5	5.00	5.95	4.60	4.75	4.60	5.30	5.25	
3				6.4	5.02	5.82	4.60	4.60	4.60	5.25	5.25	
4			5.75	6.3	5.02	5.75	4.60	4.60	4.60	5.15	5.20	
5		4.50		6.2	5.28	5.65	4.65	4.55	4.55	5.10	5.20	
6				6.2	5.9	5.45	4.65	4.55	4.50	5.10	5.20	
7				6.0	6.2	5.32	4.60	4.60	4.50	5.10	5.20	
8	5.00			5.7	6.35	5.28	4.60	4.60	4.50	5.00	5.20	
9				5.7	6.6	5.28	4.60	4.60	4.50	4.90	5.20	5.0
10				5.55	6.8	5.18	4.60	4.60	4.50	4.90	5.00	
11			5.7	5.42	7.4	5.20	4.60	4.60	4.90	4.90	4.90	
12		4.40		5.40	7.3	5.18	4.60	4.60	4.92	4.90	4.85	
13				5.40	7.0	5.10	4.60	4.55	5.30	4.90	4.80	
14				5.35	6.7	5.10	4.60	4.50	5.30	4.90	4.70	
15				5.38	6.8	5.12	4.60	4.50	5.30	4.80	4.70	

Daily gage height, in feet, of Wild Rice River at Twin Valley, Minn., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	7.7	......	5.55	5.20	6.8	5.10	4.60	4.50	5.25	4.80	4.70	5.1
17	......	......	5.55	4.90	6.7	5.00	4.60	4.70	5.25	5.00	4.80	......
18	......	......	5.6	5.00	6.8	4.90	4.60	4.70	5.20	6.05	4.80	......
19	......	4.40	......	5.00	6.8	4.90	4.70	4.80	5.10	5.88	4.70	......
20	......	......	......	4.95	7.2	4.90	4.80	4.70	5.10	5.90	4.60	......
21	......	......	......	4.92	7.0	4.85	5.00	4.70	5.20	5.90	4.70	......
22	5.15	......	......	4.95	6.9	4.80	5.10	4.60	5.30	5.90	4.70	......
23	......	......	......	4.85	6.9	4.75	5.10	4.60	5.30	5.90	4.60	5.2
24	......	......	......	4.82	6.7	4.75	5.00	4.60	5.40	5.90	4.65	5.2
25	......	......	5.6	4.80	6.9	4.75	4.90	4.55	5.5	5.80	4.70	......
26	......	6.0	......	4.88	6.9	4.70	4.90	4.50	5.5	5.70	4.90	......
27	......	......	......	4.90	6.6	4.70	4.85	4.40	5.5	5.60	4.90	......
28	......	......	......	4.92	6.3	4.70	4.80	4.50	5.5	5.60	5.10	......
29	4.95	......	......	5.00	6.3	4.65	4.70	4.50	5.40	5.55	5.15	......
30	......	......	......	5.00	6.1	4.60	4.80	4.60	5.40	5.50	4.7	5.2
31	......	......	......	......	6.05	......	4.80	4.60	......	5.40	......	......

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 31, and about Nov. 17 to Dec. 31.

Daily discharge, in second-feet, of Wild Rice River at Twin Valley, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	501	110	295	32	52	32	168	148
2	419	92	284	32	52	32	148	138
3	393	96	254	32	32	32	138	138
4	367	96	239	32	32	32	120	129
5	343	144	218	38	28	28	110	129
6	343	272	178	38	28	23	110	129
7	295	343	152	32	32	23	110	129
8	228	380	144	32	32	23	92	129
9	228	445	144	32	32	23	75	129
10	198	501	125	32	32	23	75	92
11	172	688	129	32	32	75	75	75
12	168	654	125	32	32	78	75	67
13	168	560	110	32	28	148	75	59
14	158	473	110	32	23	148	75	44
15	164	501	114	32	23	148	59	44
16	129	501	110	32	23	138	59	44
17	75	473	92	32	44	138	92	....
18	92	501	75	32	44	129	307	....
19	92	501	75	44	59	110	268	....
20	84	622	75	59	44	110	272	....
21	78	560	67	92	44	129	272	....
22	84	530	59	110	32	148	272	....
23	67	530	52	110	32	148	272	....
24	62	473	52	92	32	168	272	....
25	59	530	52	75	28	188	250	....
26	72	530	44	75	23	188	228	....
27	75	445	44	67	17	188	208	....
28	78	367	44	59	23	188	208	....
29	92	367	38	44	23	168	198	....
30	92	319	32	59	32	168	188	....
31	....	307	....	59	32	....	168	....

NOTE.—Daily discharge computed from a rating curve fairly well defined between discharges 23 and 3,400 second-feet. Discharge Jan. 1 to Mar. 31 and Nov. 17 to Dec. 31 estimated, because of ice, from climatologic records, weekly gage heights, four discharge measurements, and discharge of adjacent drainage areas, as follows: Jan. 1–31, 31 second-feet, varying from about 50 to 20 second-feet; Feb. 1–28, 13 second-feet, varying from about 10 to 25 second-feet; Mar. 1–31, 25 second-feet; Nov. 17–30, 30 second-feet, varying from about 44 to 17 second-feet; Dec. 1–31, 19 second-feet.

Monthly discharge of Wild Rice River at Twin Valley, Minn., for 1912.

[Drainage area, 805 square miles.] [a]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January			31	D.
February			13	D.
March			25	D.
April	501	59	179	C.
May	688	92	416	B.
June	295	32	118	B.
July	110	32	49.5	C.
August	59	17	33.0	C.
September	188	23	106	B.
October	307	59	163	B.
November	148		68.1	C.
December			19	D.
The year			102	

[a] "Discharge per square mile" and "Run-off (depth in inches on drainage area)" are not published for this station because of the effect of the dams noted under "Artificial control." These dams are closed during the winter and are used during the spring and early summer to assist log driving to the mills at Ada. The dam on Lower Rice Lake is said to store water to a depth of about 8 feet in the lake, representing a storage capacity of about 895 million cubic feet.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

DEVILS LAKE NEAR DEVILS LAKE, N. DAK.[1]

Location.—At the Chautauqua grounds steamer landing, 6 miles southwest of the city of Devils Lake.

Records available.—June 8, 1901, to September 30, 1911; fragmentary gage heights.

Drainage area.—Theoretically somewhat more than 3,500 square miles; surveys made about 25 years ago showed the lake to be about 35 miles long, the width ranging from 1 to 15 miles and the area being approximately 120 square miles; because of its many bays and slender arms the shore line measures more than 200 miles. The present area of the lake is not given but is estimated at not more than 60 square miles; as the lake has no outlet its size depends entirely on the relations between evaporation from its surface and the rainfall upon it and inflow from the surrounding country.

Gage.—A staff attached to piles of the pier at the steamer landing; read occasionally by E. E. Heerman and J. M. Brannon. The gage zero [2] is 1,416.2 feet above sea level, and 22.90 feet below a standard United States survey bench-mark post which is set in the bank directly behind the gage and about 8 rods distant.

Gage height of Devils Lake, N. Dak., in 1912.

Date.	Feet.	Date.	Feet.	Date.	Feet.	Date.	Feet.
May 8	8.82	June 14	9.10	July 11	9.60	Aug. 7	9.69
20	9.12	30	9.36	21	9.63	14	9.70
30	8.78	July 8	9.58	Aug. 2	9.68	24	9.70

RED LAKE RIVER AT THIEF RIVER FALLS, MINN.

Location.—One-third mile below the dam at Thief River Falls, and a mile or more below the mouth of Thief River.

Records available.—July 2, 1909, to December 31, 1912.

Drainage area.—3,430 square miles.

Gage.—Vertical and inclined staff; read morning and evening; datum unchanged.

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[1] For description of Devils Lake and all data available from 1867 to 1908 see Water-Supply Paper U. S. Geol. Survey No. 245, pp. 51-54.

[2] In the descriptions of the station published in Water-Supply Paper U. S. Geol. Survey No. 66, p. 14, and No. 85, p. 238, the statement of the elevation of the bench mark above mean sea level was in error.

Channel.—Practically permanent. The control is changed temporarily by log jams that form below.

Discharge measurements.—Made from a car and cable at the gage.

Winter flow.—The river is frozen over from the latter part of November to the first of April, and measurements are made through the ice to determine the winter flow.

Artificial control.—A short distance above the station is the dam used by the Hansen & Barzen Milling Co. and the city lighting plant. The fluctuating loads on the turbines, produced by the operation of the lighting plant at night and of the mill chiefly during the day time, cause fluctuations in the river stage below the dam.

Accuracy.—Logs floated down the river may jam below the station and cause backwater. Conditions at this station are not satisfactory and similar conditions exist at all points on the upper river. Therefore, the records can not be considered better than fair.

Discharge measurements of Red Lake River at Thief River Falls, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 7[a]	G. Monley..............	....	(b)	Nov. 14	W. B. Stevenson.......	4.01	231
Mar. 19[a]	Geo. Ebner..............	2.70	0.4	Dec. 22[c]	.....do..................	3.43	25
Sept. 17	E. F. Chandler..........	4.27	229				

[a] Measurements under complete ice cover 2 feet thick.
[b] Estimated less than 10 second-feet.
[c] Partial ice cover.

Daily gage height, in feet, of Red Lake River at Thief River Falls, Minn., for 1912.

[C. P. Quist, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	......	2.6	3.7	3.10	3.70	4.05	3.65	3.30	4.55	4.45	3.65
2	3.8	2.8	......	4.4	3.25	3.20	4.05	3.75	4.0	4.6	4.05	4.4
3	......	......	......	4.5	3.05	3.70	3.70	3.80	4.05	4.35	3.75	4.4
4	......	......	......	4.8	2.70	3.30	3.20	3.78	4.05	4.4	4.5	4.25
5	2.8	......	2.6	4.9	3.40	3.30	3.30	4.15	3.95	4.35	4.55	4.3
6	......	2.7	......	5.2	4.45	3.28	3.05	4.0	4.1	4.15	4.35	4.2
7	......	......	......	4.4	3.70	3.25	3.20	4.15	3.92	4.45	4.2	4.25
8	......	......	2.6	3.85	3.60	3.08	3.10	3.75	3.60	4.4	4.35	3.55
9	3.6	2.6	......	3.95	3.65	2.80	3.35	3.80	4.15	4.1	4.4	4.5
10	3.8	......	......	3.70	3.60	3.25	4.15	4.2	4.1	4.35	3.95	4.5
11	......	......	......	4.05	3.60	3.35	3.65	3.40	3.95	4.35	4.5	4.55
12	2.4	......	2.6	3.85	3.25	3.25	3.45	4.2	3.80	4.3	4.45	4.5
13	......	2.6	......	3.40	3.15	3.30	3.40	4.1	4.05	4.0	4.45	4.5
14	......	......	......	2.85	3.45	3.40	3.90	4.15	4.15	4.35	4.45	4.25
15	......	......	2.6	3.55	3.38	3.65	4.6	4.2	3.82	4.25	4.4	......
16	2.8	2.7	......	3.60	3.40	3.35	4.1	4.15	4.2	4.15	4.2	......
17	......	......	......	3.28	3.45	3.80	4.1	4.15	4.15	4.2	3.50	......
18	......	......	......	3.50	3.40	3.95	4.3	3.30	4.25	4.2	4.3	4.3
19	3.5	......	2.6	3.20	3.20	3.85	3.60	4.0	4.3	4.15	4.4	......
20	......	2.7	......	3.00	3.72	3.80	4.4	4.15	4.35	3.80	4.3	......
21	......	......	......	2.60	3.55	3.82	3.9	4.0	4.3	4.3	4.4	4.4
22	......	......	2.6	3.00	3.85	3.82	4.55	4.05	3.60	4.3	4.4	3.45
23	2.9	2.6	......	3.65	3.80	3.55	4.1	4.1	4.3	4.2	4.4	......
24	......	......	......	2.65	3.65	3.90	4.1	4.1	5.6	4.2	3.2	4.3
25	......	......	......	2.65	3.80	3.60	4.6	3.35	5.2	4.2	4.15	......
26	2.9	......	4.6	3.10	3.35	3.70	4.05	4.2	4.6	4.4	4.3	......
27	......	2.6	......	3.65	3.58	3.65	3.90	4.3	5.2	4.0	4.3	4.3
28	......	......	......	2.58	3.60	3.68	3.85	4.2	5.3	4.3	4.1	......
29	......	......	3.0	2.65	3.48	3.70	4.1	3.95	5.2	4.3	4.25	......
30	2.8	......	......	2.65	3.05	3.05	4.0	3.80	5.2	4.45	4.25	......
31	......	......	......	......	3.30	......	4.05	4.0	......	4.4	......	4.3

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to Apr. 7, and Nov. 21 to Dec. 31, and by logs about July 10 to Oct. 2. The gage observer made the following notes: June 19, log drive nearing Thief River; July 10, 15, 20, and 25, sluicing logs; Oct. 3, river cleared by a Crookston drive.

Daily discharge, in second-feet, of Red Lake River at Thief River Falls, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	32	132	212	90	38	310	372
2	....	50	43	212	110	165	325	293
3	....	28	132	132	121	176	340	166
4	....	8	57	43	117	176	356	389
5	....	72	57	57	200	154	340	406
6	....	325	54	28	165	188	278	340
7	....	132	50	43	200	147	372	293
8	165	110	30	32	110	81	356	340
9	188	121	12	64	121	200	356	356
10	132	110	50	225	212	188	340	220
11	212	110	64	110	50	154	340	389
12	165	50	50	72	212	121	324	372
13	72	38	57	64	188	176	234	372
14	14	81	72	165	200	200	340	372
15	100	69	121	358	212	125	308	356
16	110	72	64	212	200	212	278	293
17	54	81	154	200	200	200	293	102
18	90	72	188	252	38	225	293	324
19	43	43	165	90	165	238	278	356
20	23	136	154	280	200	252	179	324
21	6	100	158	154	165	238	324	....
22	23	165	158	325	176	81	324	....
23	121	154	100	200	188	238	293	....
24	7	121	176	188	188	718	293	....
25	7	154	110	325	43	540	293	....
26	32	64	132	176	212	325	356	....
27	121	106	121	143	238	540	234	....
28	5.8	110	128	132	212	582	324	....
29	7	86	132	188	154	540	324	....
30	7	28	28	165	121	540	372	....
31	....	57	....	176	165	....	356	....

NOTE.—Daily discharge computed from 3 rating curves fairly well defined. Effects of logs upon the relation of gage height to discharge necessitated the use of more than one rating curve. Discharge July 10 to 31 computed by indirect methods. See footnotes to table of daily gage height. Discharge Jan. 1 to Apr. 7 and Nov. 21 to Dec. 31 estimated, because of ice, from discharge measurements, semi-weekly gage heights, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 1–31, 4 second-feet, varying from about 1 to 50 second-feet; Feb. 1–29, 4 second-feet, varying from about 1 to 50 second-feet; Mar. 1–31, 7 second-feet, varying from about 1 to 50 second-feet; Apr. 1–7, 123 second-feet, varying from about 40 to 200 second-feet; Nov. 21–30, 200 second-feet; Dec. 1–31, 125 second-feet.

Monthly discharge of Red Lake River at Thief River Falls, Minn., for 1912.

[Drainage area, 3,430 square miles.] [a]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	....	....	4	
February	....	....	4	
March	....	....	7	
April	212	5.8	85.5	C.
May	325	8	93.1	B.
June	188	12	98.3	B.
July	358	28	162	C.
August	238	38	160	B.
September	718	38	259	C.
October	372	179	314	B.
November	406	....	280	C.
December	....	....	125	
The year	718	....	133	

[a] Of the 2,420 square miles of this drainage area above the mouth of Thief River, at least three-fourths is said to be composed of swamp and lake area. Although the natural discharge is not controlled at this point, a considerable part of the land in the drainage basin probably does not contribute directly to the flow past the gaging station except possibly during high water. Estimates of "Discharge per square mile" and "Run-off (depth in inches on drainage area)" would therefore be misleading and are not published.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

RED LAKE RIVER AT CROOKSTON, MINN.

Location.—At new Sampson's addition highway bridge in Crookston, less than one-fourth mile below the dam and power house of the Crookston Waterworks, Power & Light Co.; no tributaries within several miles.

Records available.—May 19, 1901, to December 31, 1912.

Drainage area.—5,320 square miles.

Gage.—Automatic gage installed in September, 1911, replacing the chain gage which was attached to the new Sampson's addition bridge July 1, 1909. The chain gage was set to read the same as the original gage which was fastened to the bridge 20 rods above. A vertical staff near the automatic reads to the same datum as the gages previously used.

Channel.—Changes slightly from year to year.

Discharge measurements.—Made from new bridge.

Winter flow.—During the winter of 1911 and 1912 the flow in the river was so small that the percentage variation caused by the power plant was greater than ever before. During periods of low flow the ice accumulated to such an extent that when the gates were opened the open channels worn through the ice were inadequate for carrying the flow and the gage heights rose rapidly. When the gates were closed the gage heights remained high usually for a long time, as there was not free passage for the water to drain away. Hence, if the power plant was in operation for several hours so as to raise the water to a nearly unchanging gage height, it took 20 to 40 hours for the gage heights to change to the minimum when the gates were closed.

Accuracy.—The operation of the power plant causes fluctuations in the water surface at the station, but the use of the automatic gage should give excellent results.

Discharge measurements of Red Lake River at Crookston, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 27[a]	Monley and Ebner	2.59	10	July 22[d]	E. F. Chandler	2.52	136
27[a]	.....do	4.06	18	Sept. 19[d]	.....do	2.42	55
Mar. 2[b]	E. F. Chandler	2.72	14	27	.....do	6.24	1,610
2[c]	.....do	4.92	182	Oct. 1	W. B. Stevenson	6.18	1,650
17[d]	Geo. Ebner	2.87	18	Dec. 23[e]	.....do	4.57	438

[a] Measurement made under complete ice cover. Average thickness, 1.4 feet.

[b] Measurement made under complete ice cover. Average thickness, 1.4 feet. Average distance water surface to top of ice, 0.35 foot.

[c] Power house in operation. Ice cover.

[d] Measurement made by wading.

[e] Measurement made under complete ice cover.

Daily gage height, in feet, of Red Lake River at Crookston, Minn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.63	2.40	3.45	4.5	3.0	2.85	3.25	......	3.4	6.2	3.8	......
2	2.84	2.58	3.5	4.7	2.90	3.4	2.55	......	2.72	6.0	3.75	3.45
3	2.73	3.3	3.5	4.9	2.88	2.80	2.53	2.83	2.64	5.6	3.6	3.45
4	2.75	3.9	3.1	5.2	2.90	3.15	3.8	3.0	2.78	......	3.65	3.2
5	2.83	3.6	3.35	6.1	3.15	3.1	3.15	2.85	2.91	4.8	3.6	3.8
6	2.82	2.93	3.45	6.4	3.1	3.0	2.99	3.6	4.2	4.5	3.7	......
7	3.1	3.3	3.45	6.4	3.05	2.97	3.2	3.5	3.05	4.9	3.65	......
8	2.65	3.45	3.55	7.1	3.35	2.96	2.81	2.91	3.1	4.6	3.7	3.25
9	2.60	3.65	3.55	6.8	3.35	3.4	2.70	3.0	2.75	4.6	3.7	3.45
10	2.94	3.5	3.5	5.4	3.45	2.70	2.53	3.7	3.1	4.4	3.6	3.6

Daily gage height, in feet, of Red Lake River at Crookston, Minn., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	....	3.65	3.25	4.6	3.5	2.63	2.82	3.85	3.9	4.3	3.7	3.15
12	....	3.55	3.3	4.5	3.4	2.69	2.54	2.75	2.81	4.4	3.7	3.45
13	....	3.6	3.25	4.4	3.65	2.94	3.9	2.86	3.25	3.9	3.7	3.8
14	....	3.95	3.35	4.4	3.75	2.55	2.83	3.3	4.0	4.3	....	3.0
15	....	3.8	3.4	4.4	3.8	2.91	2.47	....	....	4.1	3.85	3.45
16	....	3.5	3.5	3.85	3.6	3.15	3.4	....	....	4.3	3.8	3.25
17	2.91	3.6	3.5	3.65	3.6	3.25	3.15	....	....	4.0	3.6	3.25
18	2.75	3.6	3.15	2.83	3.75	3.25	3.15	....	....	4.6	3.7	3.55
19	2.55	3.3	3.25	3.2	3.45	3.15	4.1	....	4.0	4.0	....	3.35
20	3.1	3.55	3.25	3.15	3.5	3.15	3.5	....	3.06	3.65	....	3.1
21	2.92	3.5	3.35	3.1	3.3	....	3.65	....	....	3.75	3.75	3.4
22	....	3.4	3.35	2.83	3.2	....	3.7	....	....	3.8	3.5	3.4
23	....	3.5	3.5	3.0	3.3	....	3.4	3.25	4.2	3.6	3.35	3.7
24	2.72	3.65	3.65	2.68	3.3	4.0	3.3	2.90	3.95	3.7	....	3.55
25	2.90	3.4	3.5	2.96	3.0	2.82	3.25	3.45	4.3	3.85	2.85	3.6
26	2.81	3.25	3.6	2.76	3.35	2.75	3.7	4.4	6.3	3.7	3.25	4.0
27	2.92	3.5	3.9	2.96	3.75	3.45	3.55	3.55	5.8	3.6	2.87	3.7
28	2.79	3.5	3.7	3.0	3.3	2.99	3.6	2.93	6.7	3.65	2.86	3.65
29	2.76	3.45	4.3	2.60	3.25	2.62	3.7	2.98	6.8	3.65	3.45	3.8
30	2.86	....	5.2	2.76	3.2	3.85	....	2.92	6.6	3.7	3.6	3.85
31	2.39	....	5.4	....	3.0	....	....	4.1	....	3.8	....	3.65

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 10 and about Nov. 16 to Dec. 31.

Daily discharge, in second-feet, of Red Lake River at Crookston, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	217	178	288	320	332	1,720	466
2	....	191	332	104	330	145	1,590	448
3	....	186	165	100	173	126	1,350	395
4	....	191	259	466	217	160	1,100	412
5	....	259	245	259	178	194	910	395
6	....	245	217	214	395	625	760	430
7	....	231	209	273	363	231	965	412
8	....	317	207	168	194	245	810	430
9	....	317	332	140	217	152	810	430
10	....	348	140	100	430	245	715	395
11	810	363	123	170	484	502	670	430
12	760	332	138	102	152	168	715	430
13	715	412	201	502	181	288	502	430
14	715	448	104	173	302	540	670	450
15	715	466	194	87	320	540	580	484
16	484	395	259	332	290	540	670	....
17	412	395	288	259	300	540	540	....
18	173	448	288	259	270	540	810	....
19	273	348	259	580	190	540	540	....
20	259	363	259	363	240	231	412	....
21	245	302	260	412	260	450	448	....
22	173	273	240	430	290	540	466	....
23	217	302	160	332	288	625	395	....
24	135	302	540	302	191	521	430	....
25	207	217	170	288	348	670	484	....
26	155	317	152	430	715	1,780	430	....
27	207	448	348	379	379	1,470	395	....
28	217	302	214	395	199	2,050	412	....
29	116	288	121	430	212	2,120	412	....
30	155	273	484	450	196	1,980	430	....
31	....	217	....	810	580	....	466	....

NOTE.—Daily discharge computed from a rating curve fairly well defined. Daily discharge estimated June 21 to 23; July 30 to Aug. 2; Aug. 15 to 22; Sept. 15 to 18, 21 and 22; Oct. 4 and Nov. 14. Discharge Jan. 1 to Apr. 10 and Nov. 16 to Dec. 31, estimated, because of ice, from discharge measurements, gage heights, observer's reports, and climatologic records, as follows: Jan. 1–31, 31 second-feet, varying from about 63 to 15 second-feet; Feb. 1–29, 37 second-feet, varying from about 42 to 15 second-feet; Mar. 1–31, 43 second-feet, varying from about 25 to 117 second-feet; Apr. 1–10, 460 second-feet, varying from about 100 to 1,200 second-feet; Nov. 16–30, 295 second-feet; Dec. 1–31, 165 second-feet.

Monthly discharge of Red Lake River at Crookston, Minn., for 1912.

[Drainage area, 5,320 square miles.[a]]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			31	1,910	D.
February			37	2,130	D.
March			43	2,640	D.
April			391	23,300	C.
May	466	186	313	19,200	B.
June	540	104	236	14,000	B.
July	810	87	310	19,100	C.
August	715	152	297	18,300	C.
September	2,120	126	636	37,800	B.
October	1,720	395	697	42,900	B.
November	484		362	21,500	C.
December			165	10,100	C.
The year	2,120		293	213,000	

[a] "Second-feet per square mile" and "Run-off (depth in inches)" computed from this drainage area are not published because of the effect of the four power plants above the gaging station at Crookston and the fact that a large portion of the drainage area is swamp land.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

THIEF RIVER NEAR THIEF RIVER FALLS, MINN.

Location.—At the Drybrooke ford, 6 miles north of Thief River Falls, in sec. 3, T. 154 N., R. 43 W. The nearest tributary is the outlet of Mud Lake which enters Thief River in the northeastern part of T. 156 N., R. 42 W.

Records available.—July 1, 1909, to December 31, 1912.

Drainage area.—1,010 square miles.

Gage.—Inclined staff; datum unchanged since establishment. When this inclined staff gage was installed on August 19, 1909, its reading (6.36 feet) was made to agree with that of the temporary vertical staff gage which had been used from July 1 to August 18, 1909. On June 29, 1911, and September 18, 1912, it was found by wye levels that the gage was in error (the amounts being the same), probably the result of a mistake in graduating or setting the gage at the time of its installation. Assuming the 6.4 point to be correct, the results of the levels are as follows:

Inclined-rod gage readings	5.2	6.0	7.0	8.0	9.0	10.0	11.0
True elevations	5.28	6.03	6.96	7.90	8.85	9.80	10.75

As the whole record at this station (except July 1, to Aug. 18, 1909) is referred to this inclined-rod gage and is therefore consistent in itself, no correction has been made in published gage heights because of the above discrepancy.

Channel.—Practically permanent.

Discharge measurements.—Made by means of a boat and cable a short distance below the gage.

Winter flow.—From the middle of November to the first of April the river is entirely frozen over, and discharge measurements are made to determine the winter discharge.

Artificial control.—The dam at Thief River Falls, at the mouth of Thief River, backs up the water in Thief River for several miles, but the station is protected by the rapids below from the influence of the dam. During 1910 and 1911 drainage work has been carried on extensively in Thief River Basin and the effect will be to modify the regimen of the river. The extremely low flow of 1910 and 1911 was due partly to the holding back of the run-off by temporary dams for use of the floating dredges above the station.

Accuracy.—See remarks under "Gage" above.

Discharge measurements of Thief River near Thief River Falls, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 18	E. F. Chandler	3.77	3.7
Dec. 21[a]	W. B. Stevenson	5.00	16.7

[a] Measurement made under partial ice cover.

Daily gage height, in feet, of Thief River near Thief River Falls, Minn., for 1912.

[H. J. Maland, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.12	3.85	3.75	3.45	3.55	3.49	4.84	5.1	....
2	4.31	3.85	3.80	3.63	3.49	3.48	4.72	4.80	....
3	4.61	3.81	3.80	3.61	3.48	3.46	4.76	4.77	....
4	4.63	3.77	3.75	3.56	3.45	3.45	4.74	4.70	....
5	4.84	3.87	3.79	3.48	3.48	3.45	4.65	4.65	4.3
6	4.80	3.94	4.15	3.45	3.55	3.45	4.70	4.60	....
7	4.63	3.90	3.83	3.45	3.55	3.42	4.77	4.07	....
8	4.42	3.93	3.76	3.45	3.55	3.42	4.76	4.75	....
9	4.38	3.85	3.67	3.73	3.48	3.45	4.70	4.67	....
10	4.40	3.81	3.61	3.74	3.46	3.46	4.80	4.70	....
11	4.30	3.75	3.67	3.71	3.45	3.60	4.75	4.70	....
12	4.32	3.66	3.67	3.66	3.45	3.65	4.70	4.67	....
13	4.22	3.59	3.65	3.70	3.44	3.85	4.70	4.65	....
14	4.22	3.55	3.65	3.76	3.42	3.89	4.65	4.65	....
15	4.12	3.57	3.70	3.77	3.40	3.90	4.63	4.77	....
16	4.04	3.60	3.75	3.73	3.40	3.85	4.60	4.90	....
17	4.00	3.55	3.70	3.67	3.46	3.79	4.59	4.77	....
18	3.89	3.49	3.69	3.63	3.49	3.77	4.32	4.75	....
19	3.85	3.77	3.64	3.59	3.55	3.75	4.65	5.0	....
20	3.76	4.15	3.63	3.56	3.56	3.93	4.65	4.65	....
21	3.74	4.08	3.63	3.60	3.56	4.01	4.73	4.73	5.0
22	3.73	4.12	3.61	3.73	3.49	4.02	4.57	4.87	....
23	3.69	4.22	3.57	3.70	3.49	4.02	4.13	4.77	....
24	3.67	4.28	3.48	3.65	3.57	4.85	4.38	4.65	....
25	3.69	4.22	3.42	3.63	3.55	5.1	5.15	4.58	....
26	3.81	4.05	3.40	3.59	3.48	5.1	4.80	4.62	....
27	3.85	3.77	3.40	3.67	3.45	5.35	4.55	4.60	....
28	3.87	3.77	3.40	3.71	3.48	5.30	4.69	....	....
29	3.79	3.79	3.38	3.63	3.55	5.15	4.72	....	....
30	3.80	3.80	3.35	3.59	3.55	5.35	4.57	....	....
31	....	3.77	....	3.56	3.55	....	4.70	....	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 7 and about Nov. 16 to Dec. 31.

Daily discharge, in second-feet, of Thief River near Thief River Falls, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	4.0	3.1	1.2	1.7	1.4	55	84
2	....	4.0	3.5	2.2	1.4	1.3	45	51
3	....	3.6	3.5	2.1	1.3	1.2	48	49
4	....	3.3	3.1	1.8	1.2	1.2	46	43
5	....	4.1	3.4	1.3	1.3	1.2	39	39
6	....	4.8	9.8	1.2	1.7	1.2	43	35
7	....	4.4	3.8	1.2	1.7	1.0	49	6.9
8	23	4.7	3.2	1.2	1.7	1.0	48	47
9	21	4.0	2.5	2.9	1.3	1.2	43	41
10	22	3.6	2.1	3.0	1.2	1.2	51	43
11	17	3.1	2.5	2.8	1.2	2.0	47	43
12	18	2.4	2.5	2.4	1.2	2.4	43	41
13	13	1.9	2.4	2.7	1.1	4.0	43	39
14	13	1.7	2.4	3.2	1.0	4.3	39	39
15	8.4	1.8	2.7	3.3	.9	4.4	37	49

Daily discharge, in second-feet, of Thief River near Thief River Falls, Minn., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16	6.3	2.0	3.1	2.9	.9	4.0	35	....
17	5.5	1.7	2.7	2.5	1.2	3.4	34	....
18	4.3	1.4	2.6	2.2	1.4	3.3	18	....
19	4.0	3.3	2.3	1.9	1.7	3.1	39	....
20	3.2	9.8	2.2	1.8	1.8	4.7	39	....
21	3.0	7.1	2.2	2.0	1.8	5.7	45	....
22	2.9	8.4	2.1	2.9	1.4	5.9	33	....
23	2.6	13	1.8	2.7	1.4	5.9	8.8	....
24	2.5	16	1.3	2.4	1.8	56	21	....
25	2.6	13	1.0	2.2	1.7	84	90	....
26	3.6	6.5	.9	1.9	1.3	84	51	....
27	4.0	3.3	.9	2.5	1.2	119	32	....
28	4.1	3.3	.9	2.8	1.3	111	42	....
29	3.4	3.4	.8	2.2	1.7	90	45	....
30	3.5	3.5	.6	1.9	1.7	119	33	....
31	....	3.3	....	1.8	1.7	....	43	....

NOTE.—Daily discharge computed from a rating curve well defined above 3 second-feet. Discharge Jan. 1 to Apr. 7 and Nov. 16 to Dec. 31, estimated, because of ice, from observer's notes, gage heights, and climatologic records, as follows: No flow Jan. 1 to Mar. 26; Mar. 27–31, 3 second-feet, varying from about 1 to 5 second-feet; Apr. 1–7, 10 second-feet; Nov. 16–30, 22 second-feet, varying from about 10 to 51 second-feet; Dec. 1–31, 14 second-feet. Where no flow is noted the discharge is estimated to have been less than 0.1 second-foot.

Monthly discharge of Thief River near Thief River Falls, Minn., for 1912.

[Drainage area, 1,010 square miles.[a]]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	....	....	0.00	
February	....	....	.00	
March	....	....	.5	
April	23	....	8.70	C.
May	16	1.4	4.85	B.
June	9.8	.6	2.53	C.
July	3.3	1.2	2.23	C.
August	1.8	.9	1.42	C.
September	119	1.0	24.3	B.
October	90	8.8	41.4	B.
November	84	....	32.7	C.
December	....	....	14	
The year	119	....	11.0	

[a] "Second-feet per square mile" and "Run-off (depth in inches)" are not published for this station, because such values are rendered misleading by the large amount of swamp and recently drained land in the basin of Thief River.

NOTE.—See footnote to table of daily discharge.

CLEARWATER RIVER AT RED LAKE FALLS, MINN.

Location.—At Great Northern Railway bridge at Red Lake Falls, Minn., about 1½ miles above the mouth of the river and 2 miles below the nearest tributary.

Records available.—June 18, 1909, to December 31, 1912.

Drainage area.—1,310 square miles.

Gage.—Vertical staff about half a mile farther downstream than the original gage. Staff was placed September 12, 1911, on account of the building of a dam which will cause several feet of backwater at the original section. The new gage was set to read 2.23 feet when the original gage read 5.83 feet. Owing to the fact that the new gage is at a different section, measurements referred to the old gage can not be used to rate the new section.

Channel.—Practically permanent.

Discharge measurements.—Made from the railroad bridge or by wading.

Winter flow.—The river is usually frozen over from the middle of November to the 1st of April. Measurements are made through the ice to determine the winter discharge.

Accuracy.—Backwater from the Healy dam on Red Lake River may slightly affect the relation of gage height to discharge at this new site if flashboards are put in place at the Healy dam. Because of the large amount of swamp land, some of which is being drained artificially, in the area above this station estimates of "run-off in second-feet per square mile" and "run-off (depth in inches on drainage area)" would be misleading if computed from the drainage area given above. Sufficient data have not been collected at the new section to permit estimates of discharge to be made.

Discharge measurements of Clearwater River at Red Lake Falls, Minn., for 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 6[a]	Gorie Monley..........	2.10	45	July 22	E. F. Chandler.........	2.61	151
Mar. 19[b]	Geo. Ebner.............	6.40	22	Oct. 18	E. J. Budge.............	2.79	215
27	E. J. Budge............	2.74	190	Dec. 20[c]	W. B. Stevenson.......	3.01	45

[a] Complete ice cover; average thickness, 2.2 feet.
[b] Measurement made by wading 1,000 feet above gage.
[c] Measurement made under ice.

Daily gage height, in feet, of Clearwater River at Red Lake Falls, Minn., for 1912.

[Leo Steinert, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			7.6	2.75	2.5	2.1	2.45	2.0	4.4	2.3	2.6
2			7.7	2.7	2.5	2.1	2.45	2.05	4.65	2.25	2.6
3			8.0	2.7	2.6	2.1	2.35	2.5	4.0	2.2	2.7
4			8.2	2.75	2.6	2.1	2.15	2.45	3.7	2.25	2.55
5			8.6	2.8	2.55	2.1	2.15	2.25	3.4	2.3	2.7
6	2.1		8.6	2.9	2.45	2.0	2.15	2.0	3.4	2.3	2.45
7			8.4	2.95	2.5	2.0	2.1	1.95	3.4	2.3	2.55
8			8.0	3.05	2.6	2.0	2.1	1.9	3.2	2.3	2.8
9			7.6	3.05	2.45	2.0	3.05	1.9	3.1	2.25	2.35
10			7.5	3.05	2.35	2.15	2.1	1.9	3.0	2.2	3.5
11			6.6	3.05	2.3	2.3	2.1	2.0	3.1	2.3	3.15
12			3.75	3.1	2.35	2.2	2.1	2.15	3.2	2.3	3.15
13			3.8	3.2	2.35	2.4	2.1	2.7	3.2	2.3	3.15
14			3.8	3.15	2.25	2.8	2.1	3.15	3.2	2.3	3.1
15			3.15	3.15	2.4	2.8	3.05	3.15	3.05	2.3	3.0
16			2.95	3.05	2.45	2.8	2.1	3.2	2.9	2.3	3.15
17			2.9	2.95	2.45	2.8	2.1	3.15	2.9	2.0	3.3
18			2.8	2.95	2.45	2.8	2.1	3.1	3.0	2.0	3.25
19		6.4	2.75	2.95	2.55	2.8	2.1	3.05	3.0	2.0	3.35
20			2.7	2.85	2.5	2.7	2.1	2.95	3.1	2.0	3.05
21			2.7	2.8	2.5	2.6	2.15	3.0	3.1	1.9	3.1
22			2.6	2.85	2.9	2.65	2.35	2.5	3.2	1.9	
23			2.6	2.8	2.25	2.8	2.1	2.85	3.2	1.8	
24			2.6	2.7	2.25	3.0	2.1	3.65	2.95	2.3	
25			2.5	2.7	2.25	3.0	2.1	3.75	2.25	2.4	
26			2.6	2.75	2.25	3.0	2.1	3.75	2.2	2.3	
27			2.5	2.75	2.35	3.0	2.1	4.2	2.2	2.5	
28			2.8	2.65	2.3	3.0	2.1	4.4	2.2	2.8	3.05
29			2.75	2.6	2.25	3.0	2.25	4.4	2.15	2.6	
30			2.7	2.5	2.15	3.55	2.1	4.3	2.4	2.15	
31				2.55		4.0	2.0		2.35		

NOTE.—For 1911 gage heights see Water-Supply Paper 305, p, 42. Relation of gage height to discharge affected by ice about Nov. 11, 1911, to Apr. 11, 1912, and Nov. 15 to Dec. 31, 1912.

SOUTH BRANCH OF TWO RIVERS AT HALLOCK, MINN.

Location.—At private wagon bridge on farm of John Ross, in sec. 12, T. 161 N., R. 49 W., half a mile north of Hallock; a mile below the nearest tributary, a small creek that enters from the west.

Records available.—April 29, 1911, to November 30, 1912.

Drainage area.—776 square miles.

Gage.—Vertical staff.

Channel.—Probably permanent, as the control point is an abandoned loose-rock dam 4 feet high, a mile or more below the station. The dam was formerly used to raise the water level for a railroad water tank.

Discharge measurements.—Made from the bridge.

Winter flow.—From November to April the river is frozen over and gage readings are discontinued.

The following discharge measurements were made by E. F. Chandler:

March 12: Discharge estimated at 0.01 second-foot, as the stream was "frozen to bottom" for almost entire width; slight seepage under ice at one portion.

September 16: Gage height, 1.53 feet; discharge, 8.3 second-feet. Made by wading.

Daily gage height, in feet, of South Branch of Two Rivers at Hallock, Minn., for 1912.

[John Ross, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Dec.
1	2.4	2.0	2.8	1.0	2.0	1.8	4.3	2.9
2	2.75	2.3	2.8	1.1	2.0	1.7	4.3	2.9
3	3.0	2.0	2.7	1.1	1.9	1.6	4.5	2.9
4	2.9	2.0	2.5	1.2	1.8	1.6	4.6	3.0
5	2.75	1.9	2.4	1.2	1.8	1.8	4.6	3.0
6	3.0	1.8	2.3	1.2	2.5	1.9	4.6	2.9
7	3.3	1.9	2.3	1.3	2.8	1.7	4.7	2.9
8	3.6	1.8	2.2	1.2	2.5	1.7	4.4	3.0
9	3.1	1.9	2.1	1.2	2.3	1.6	4.2	3.0
10	2.7	2.0	2.0	1.3	2.2	1.5	4.0	3.0
11	2.7	1.9	1.8	1.4	2.2	1.5	3.9	3.0
12	2.4	2.0	1.7	1.4	2.0	1.4	3.8	2.9
13	2.3	1.9	1.6	1.5	2.0	1.4	3.6	2.8
14	2.7	2.3	1.5	1.5	1.7	1.5	3.4	2.8
15	2.2	2.3	1.5	1.4	1.7	1.5	3.4	2.8
16	1.9	2.0	1.5	1.4	1.7	1.55	3.1	2.8
17	2.0	1.8	1.5	1.3	1.7	1.55	3.0	2.8
18	2.0	1.8	1.5	1.3	1.6	1.5	2.9	2.8
19	2.0	1.8	1.5	1.2	1.6	1.5	2.8	2.8
20	2.0	1.8	1.4	1.1	1.5	1.9	2.8	2.8
21	1.5	1.8	1.3	1.1	1.5	2.2	2.8	2.6
22	1.8	1.8	1.3	1.1	1.5	2.4	2.65	2.5
23	2.0	1.9	1.3	1.1	1.5	2.5	2.6	2.45
24	2.6	1.9	1.3	1.1	1.5	2.6	2.6	2.2
25	3.1	2.0	1.3	1.1	1.5	2.7	2.4	2.2
26	2.8	2.1	1.3	1.7	1.5	3.1	2.4	2.1
27	2.3	2.2	1.2	2.0	1.6	3.35	2.4	2.1
28	2.0	2.1	1.2	2.3	1.6	3.5	2.4	2.2
29	1.8	2.3	1.1	2.7	1.7	3.6	2.6	2.2
30	1.8	2.5	1.1	2.3	1.7	3.7	2.6	2.3
31	....	2.7	....	2.0	1.8	....	2.8	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 31, and about Nov. 16 to 30.

Daily discharge, in second-feet, of South Branch of Two Rivers at Hallock, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	39	20	63	1	20	13	179	[illegible]
2	60	34	63	1.5	20	10	179	[illegible]
3	76	20	57	1.5	16	8	197	[illegible]
4	69	20	45	2	13	8	206	76
5	60	16	39	2	13	13	206	76
6	76	13	34	2	45	16	206	[illegible]
7	97	16	34	3	63	10	215	[illegible]
8	120	13	29	2	45	10	188	76
9	83	16	24	2	34	8	170	76
10	57	20	20	3	29	6	152	76
11	57	16	13	4.5	29	6	144	76
12	39	20	10	4.5	20	4.5	136	[illegible]
13	34	16	8	6	20	4.5	120	63
14	57	34	6	6	10	6	104	63
15	29	34	6	4.5	10	6	104	63
16	16	20	6	4.5	10	7	83	....
17	20	13	6	3	10	7	76	....
18	20	13	6	3	8	6	69	....
19	20	13	6	2	8	6	63	....
20	20	13	4.5	1.5	6	16	63	....
21	6	13	3	1.5	6	29	63	....
22	13	13	3	1.5	6	39	54	....
23	20	16	3	1.5	6	45	51	....
24	51	16	3	1.5	6	51	51	....
25	83	20	3	1.5	6	57	39	....
26	63	24	3	10	6	83	39	....
27	34	29	2	20	8	100	39	....
28	20	24	2	34	8	112	39	....
29	13	34	1.5	57	10	120	51	....
30	13	45	1.5	34	10	128	51	....
31	....	57	....	20	13	....	63	....

NOTE.—Daily discharge computed from a fairly well defined rating curve. Discharge Jan. 1 to Mar. 31 estimated, because of ice, by Prof. E. F. Chandler, from climatologic records, discharge of adjacent drainage areas, one discharge measurement made Mar. 12, and observer's reports on marked variation in discharge, as follows: Jan. 1–31, 3 second-feet; Feb. 1–28, 0.5 second-foot; Mar. 1–31, 0.5 second-foot. It should be noted that these estimates are based on less data than estimates at most stations in this report and that they represent simply the best available values. Discharge Nov. 16–30 estimated, because of ice, from daily gage height, climatologic records, and discharge of adjacent areas, at 30 second-feet, varying from about 57 to 10 second-feet.

Monthly discharge of South Branch of Two Rivers at Hallock, Minn., for 1912.

[Drainage area, 776 square miles.] [a]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
April	120	6	45.5	C.
May	57	13	21.6	D.
June	63	1.5	16.8	D.
July	57	1	7.81	D.
August	63	6	16.6	D.
September	128	4.5	31.2	C.
October	215	39	110	B.
November	76	....	50.3	C.

[a] "Second-feet per square mile" and "run-off (depth in inches)" are not published for this station, because the large number of swamps (some of which have been drained artificially) included in the drainage area render such values misleading.

NOTE.—See footnotes to table of daily discharge.

PEMBINA RIVER AT NECHE, N. DAK.

Location.—At the highway bridge 20 rods east of the Great Northern Railway bridge, two-thirds of a mile north of Neche, N. Dak.

Records available.—April 29, 1903, to December 31, 1912.

Drainage area.—2,940 square miles.

Gage.—Vertical staff in two sections for medium and low stage, attached to the abutment and a piling under the bridge, at the north end of the highway bridge. This gage was installed July 31, 1911. The original gage, which can be read at medium and high stage, is a vertical staff attached to the abutment of the railway bridge. The zeros of the two gages are at the same elevation, this elevation having been unchanged since the first establishment; at low stage the slope of the water surface between the bridges is inappreciable; at highest stage the readings at the railway bridge would probably be from 0.03 to 0.06 foot greater than at the highway bridge.

Channel.—Clay and silt; slightly shifting.

Discharge measurements.—From the highway bridge. At very low stage made by wading at a section below the Great Northern dam.

Artificial control.—The water is raised at low stage from 1 to 2 feet at the gage by a loose-rock dam about 3 feet high one-third mile below, constructed to give sufficient depth of water for the intake of the Great Northern Railway water tank. There is considerable leakage through the dam, but no permanent determination of the effect of this dam can be made because it is liable to be changed by ice run or spring flood in any year. There are no reservoirs or power plants that affect the flow.

Winter flow.—The ordinary winter discharge is less than the leakage through the dam, hence estimates can not be made from gage observations without numerous discharge measurements.

Accuracy.—On account of the varying effect at low stage of the dam, the records are not considered better than fair.

Discharge measurements of Pembina River at Neche, N. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 16	Goric Monley	3.68	184
July 23	E. F. Chandler	2.35	31
Sept. 12	.....do	3.65	143

NOTE.—The measurement on July 23 was made by wading at a section below the Great Northern Railway's dam.

Daily gage height in feet, of Pembina River at Neche, N. Dak., for 1912.

[George Stainthorp, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	4.2	3.5	4.6	2.9	4.6	....	4.0	4.6
2	....	4.3	3.6	4.7	3.0	4.0	....	4.0	4.9
3	....	4.4	3.9	4.6	2.9	3.7	....	4.1	4.6
4	....	4.5	3.9	4.5	2.8	3.5	....	4.0	4.5
5	....	4.7	3.8	4.0	2.8	3.2	....	4.0	4.4
6	....	4.8	4.0	3.9	2.8	3.3	....	4.1	4.3
7	....	5.0	4.0	3.9	2.6	3.4	....	4.0	4.2
8	....	3.8	3.9	3.8	2.6	3.3	3.05	4.0	4.0
9	....	3.7	3.8	3.7	2.6	3.3	3.6	4.1	4.0
10	....	3.7	3.9	3.7	2.7	3.3	3.45	4.1	4.0

Daily gage height, in feet, of Pembina River at Neche, N. Dak., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11	....	3.9	3.8	3.8	2.7	3.0	3.3	4.2	4.2
12	....	4.0	3.8	3.7	2.8	2.8	3.25	4.2	4.7
13	....	3.9	3.7	3.7	2.9	2.6	3.0	4.1	4.7
14	....	3.8	3.7	3.6	2.9	2.6	2.0	4.0	4.7
15	....	3.8	3.7	3.6	2.9	2.4	4.0	4.0	4.7
16	....	3.9	3.7	3.6	3.0	2.0	5.0	4.0	4.7
17	....	3.8	3.7	3.5	2.9	3.0	5.0	4.0	4.7
18	....	3.7	3.6	3.5	2.8	2.8	4.9	4.0	4.7
19	....	3.6	3.6	3.4	2.8	2.75	4.0	4.0	4.5
20	....	3.6	3.5	3.3	2.7	2.5	4.0	4.0	4.5
21	....	3.6	3.5	3.2	2.7	2.4	4.0	4.0	4.5
22	....	3.5	3.5	3.1	2.8	2.0	4.0	4.0	4.5
23	....	3.5	3.4	3.0	2.8	2.3	4.8	4.0	4.5
24	....	3.5	3.7	2.9	2.7	2.4	5.0	4.0	....
25	....	3.5	3.7	2.9	2.7	3.0	4.9	3.8	....
26	....	3.4	3.5	2.9	2.7	2.8	4.8	3.8	....
27	4.1	3.4	3.8	2.8	2.8	2.7	4.6	3.8	....
28	4.2	3.4	3.9	2.8	3.0	2.8	4.4	3.7	....
29	4.2	3.6	4.0	2.8	8.0	2.7	4.4	3.6	....
30	4.2	3.6	5.0	2.8	7.3	2.6	4.2	3.6	....
31	4.2	....	4.8	....	5.6	2.6	....	3.6	....

NOTE.—The observer reported that during the first three weeks of March the river remained at a stage of 4 feet, and that there was water over the ice during the last week. The ice began moving on Apr. 1 and on Apr. 7 a jam above the dam went out. The high stage on July 29 was caused by heavy rains and the failure of a dam at Wallhalla.

The discharge relation was affected by ice from Mar. 27 to Apr. 7, from Nov. 1 to 6 and from Nov. 12 to 23, river froze completely over on Nov. 23 and readings were stopped.

Daily discharge, in second-feet, of Pembina River at Neche, N. Dak., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	150	140	274	80	274	58	195	250
2	....	150	150	288	90	195	63	195	300
3	....	150	183	274	80	161	68	208	250
4	....	160	183	260	71	140	74	195	240
5	....	160	172	195	71	110	79	195	230
6	....	180	195	183	71	120	84	208	230
7	....	180	195	183	53	130	90	195	221
8	....	172	183	172	53	120	95	195	195
9	....	161	172	161	53	120	150	208	195
10	....	161	183	161	62	120	135	208	195
11	....	183	172	172	62	90	120	221	221
12	....	195	172	161	71	71	115	221	200
13	....	183	161	161	80	53	90	208	200
14	....	172	161	150	80	53	10	195	200
15	....	172	161	150	80	37	195	195	200
16	....	183	161	150	90	10	330	195	180
17	....	172	161	140	80	90	330	195	180
18	....	161	150	140	71	71	316	195	180
19	....	150	150	130	71	66	195	195	160
20	....	150	140	120	62	45	195	195	160
21	....	150	140	110	62	37	195	195	150
22	....	140	140	100	71	10	195	195	150
23	....	140	130	90	71	30	302	195	150
24	....	140	161	80	62	37	330	195	....
25	....	140	161	80	62	90	316	172	....
26	....	130	140	80	62	71	302	172	....
27	80	130	172	71	71	62	274	172	....
28	90	130	183	71	90	71	247	161	....
29	100	150	195	71	870	62	247	150	....
30	100	150	330	71	730	53	221	150	....
31	100	....	302	....	420	53	....	150	....

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge estimated from Mar. 27 to Apr. 7, from Nov. 1 to 6, and from Nov. 12 to 23. Discharge interpolated for period from Sept. 1 to 7.

Monthly discharge of Pembina River at Neche, N. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 27-31	100	80	94.0	932	D.
April	195	130	158	9,400	C.
May	330	130	174	10,700	C.
June	288	71	148	8,810	C.
July	870	53	129	7,930	C.
August	274	10	85.5	5,260	C.
September	330	10	181	10,800	C.
October	221	150	191	11,700	C.
November 1-23	300	150	202	9,220	D.
The period				74,800	

NOTE.—Accuracy has been reduced on account of poor gage reading, and slight changes in rating caused by changes in top of the loose-rock dam below the gage.

ROSEAU RIVER AT DOMINION CITY, CANADA.

Location.—At the traffic bridge at the northeast limit of Dominion City.

Records available.—May 21 to December 31, 1912.

Drainage area.—2,280 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from bridge.

Artificial control.—During December, 1912, a dam was built 1½ miles below causing serious backwater and a new station was established.

Cooperation.—All data for this station were furnished by the water-power branch of the Canadian Department of the Interior.

Mean daily discharge in feet per second of Roseau River at Dominion City, Canada, for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		410	41	83	103	577	1,248
2		336	36	97	104	634	1,193
3		344	35	113	109	676	1,141
4		341	35	121	129	702	1,115
5		318	33	125	133	733	1,027
6		332	30	131	129	962	936
7		316	35	132	131	795	884
8		304	32	127	127	839	860
9		292	38	110	126	839	837
10		276	40	101	131	884	806
11		263	31	91	132	936	787
12		238	44	91	122	1,000	754
13		235	44	110	126	1,030	720
14		222	51	119	129	1,060	673
15		214	59	126	132	1,090	691
16		200	68	122	134	1,120	777
17		182	71	127	133	1,150	834
18		163	71	129	134	1,180	650
19		129	73	129	133	1,211	754
20	408	138	77	132	146	1,188	795
21	410	126	81	132	177	1,224	761
22	410	107	86	125	211	1,266	951
23	416	95	93	113	219	1,248	741
24	405	83	98	104	224	1,279	668
25	390	74	90	101	235	1,326	707
26	371	66	82	98	278	1,297	640
27	379	60	75	96	323	1,300	580
28	418	53	75	99	384	1,297	527
29	468	45	82	100	457	1,344	416
30	468	45	79	110	527	1,354	369
31	444		81	117		1,274	

Monthly discharge of Roseau River at Dominion City, Canada, for 1912.

[Drainage area, 2,280 square miles.]

Month.	Discharge in second-feet.			Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.		Maximum.	Minimum.	Mean.
May 20-31	468	371	416	September	527	103	186
June	410	45	200	October	1,354	577	1,059
July	98	30	60	November	1,248	369	795
August	132	83	113	December			[a] 80

[a] Estimated.

WEST BRANCH OF ROSEAU RIVER NEAR MALUNG, MINN.

Location.—At the highway bridge near the center of sec. 7, T. 161 N., R. 39 W., 6½ miles south of Roseau, 1 mile west of Malung post office, and half a mile above the mouth of the East Branch.

Records available.—May 6, 1911, to November 15, 1912.

Drainage area.—265 square miles.

Gage.—Vertical staff.

Channel.—Probably fairly permanent, although there is a possibility of temporary backwater from the East Branch.

Discharge measurements.—Made at the bridge except during low stages, when they are made at a wading section. Discharge measurements are also made on the East Branch a short distance above the junction and on Roseau River at Roseau for the purpose of determining the portion of the flow at Roseau that comes from the East Branch, and to estimate the entire flow below that point, as conditions of flow below the junction of the two branches are very unfavorable for the establishment of a regular station.

Winter flow.—From November to April the river is frozen over and observations are discontinued.

Artificial control.—Much of the area drained by Roseau River is so swampy that it can not be cultivated without drainage. In connection with this work the river channel has been straightened and widened to 80 feet for a distance of 40 miles; a drainage system benefiting 90,000 acres of land south of the river discharges into the Roseau by 10 ditches 1 mile apart in T. 163, Rs. 43 and 44. Another ditch system, draining about 20,000 acres, enters Roseau River in sec. 6, T. 162 N., R. 39 W.

Discharge measurements of West Branch of Roseau River near Malung, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 17[a]	E. F. Chandler	2.40	6.8
Oct. 9	W. B. Stevenson	7.22	387

[a] Wading measurement.

Discharge measurements of East Branch of Roseau River near Malung, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 17	E. F. Chandler	2.99	110
Oct. 9	W. B. Stevenson	6.43	344

Discharge measurements of Roseau River at Roseau, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 18	E. F. Chandler	3.49	101
Oct. 10	W. B. Stevenson	8.43	755

Daily gage height, in feet, of West Branch of Roseau River near Malung, Minn., for 1912.

[August Hedin, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		2.45	2.5	2.05	2.2	2.2	11.5	4.5
2	3.7	2.8	2.6	2.05	2.2	2.2	11.4	4.4
3	4.3	2.7	2.6	2.05	2.2	2.15	10.8	4.3
4	4.5	2.7	2.6	2.0	2.1	2.15	10.1	4.0
5	4.45	2.8	2.55	2.0	2.1	2.15	9.2	4.0
6	4.05	2.8	2.5	2.0	2.1	2.1	8.2	3.9
7	3.55	2.8	2.45	2.0	2.1	2.1	7.5	3.9
8	3.4	3.2	2.45	2.2	2.2	2.1	7.3	3.9
9	3.2	3.15	2.4	2.15	2.3	2.1	7.2	4.0
10	2.65	3.15	2.4	2.15	2.35	2.1	7.0	4.2
11	2.7	3.1	2.35	2.1	2.3	2.1	6.7	4.2
12	2.8	3.0	2.3	2.1	2.25	2.1	6.6	4.1
13	2.8	3.05	2.3	2.1	2.25	2.1	6.5	4.0
14	2.7	2.9	2.25	2.1	2.2	2.1	6.4	3.9
15	2.6	2.9	2.2	2.1	2.2	2.1	6.1	3.8
16	2.6	2.8	2.2	2.1	2.15	2.2	5.8	3.6
17	2.6	2.8	2.2	2.1	2.1	2.4	5.5	3.6
18	2.5	2.8	2.2	2.1	2.1	2.5	5.2	3.6
19	2.5	2.75	2.2	2.1	2.1	2.5	5.0	3.6
20	2.5	2.7	2.2	2.1	2.1	2.6	4.8	3.4
21	2.45	2.6	2.15	2.05	2.1	2.6	4.6	3.2
22	2.45	2.6	2.15	2.05	2.1	2.7	4.4	3.3
23	2.45	2.6	2.1	2.0	2.1	3.5	4.2	3.5
24	2.4	2.6	2.1	2.0	2.1	4.05	4.0	3.2
25	2.4	2.6	2.1	2.0	2.1	5.1	3.9	3.0
26	2.5	2.55	2.1	2.0	2.1	6.6	3.8	3.0
27	2.5	2.55	2.1	2.2	2.1	8.5	3.7	2.9
28	2.45	2.55	2.1	2.2	2.1	9.15	3.6	2.9
29	2.5	2.5	2.1	2.2	2.2	9.9	3.7	2.8
30	2.5	2.5	2.1	2.2	2.2	10.65	4.0	2.7
31		2.5		2.2	2.2		4.5	

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 6 and about Nov. 18 to 30.

Daily discharge, in second-feet, of West Branch of Roseau River near Malung, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		8.7	9.8	1.5	3.8	3.8	1,040	115
2		18	12	1.5	3.8	3.8	1,030	108
3		15	12	1.5	3.8	3.0	926	101
4		15	12	.8	2.2	3.0	807	80
5		18	11	.8	2.2	3.0	660	80
6		18	9.8	.8	2.2	2.2	514	73
7	52	18	8.7	.8	2.2	2.2	421	73
8	43	33	8.7	3.8	3.8	2.2	396	73
9	33	31	7.6	3.0	5.6	2.2	384	80
10	14	31	7.6	3.0	6.6	2.2	360	94
11	15	29	6.6	2.2	5.6	2.2	325	94
12	18	25	5.6	2.2	4.7	2.2	314	87
13	18	27	5.6	2.2	4.7	2.2	303	80
14	15	21	4.7	2.2	3.8	2.2	292	73
15	12	21	3.8	2.2	3.8	2.2	260	67
16	12	18	3.8	2.2	3.0	3.8	230	55
17	12	18	3.8	2.2	2.2	7.6	200	55
18	9.8	18	3.8	2.2	2.2	9.8	173	
19	9.8	16	3.8	2.2	2.2	9.8	155	
20	9.8	15	3.8	2.2	2.2	12	138	
21	8.7	12	3.0	1.5	2.2	12	122	
22	8.7	12	3.0	1.5	2.2	15	108	
23	8.7	12	2.2	.8	2.2	49	94	
24	7.6	12	2.2	.8	2.2	84	80	
25	7.6	12	2.2	.8	2.2	164	73	
26	9.8	11	2.2	.8	2.2	314	67	
27	9.8	11	2.2	3.8	2.2	556	61	
28	8.7	11	2.2	3.8	2.2	652	55	
29	9.8	9.8	2.2	3.8	3.8	773	61	
30	9.8	9.8	2.2	3.8	3.8	900	80	
31		9.8		3.8	3.8		115	

NOTE.—Daily discharge computed from a rating curve fairly well defined between 29 and 486 second-feet (gage heights, 3.1 and 8.0 feet). Above discharge 486 second-feet (gage height, 8.0 feet) the rating curve is an extension, but is probably accurate within about 10 per cent at discharge 960 second-feet (gage height, 11.0 feet). Discharge Jan. 1 to Apr. 6 estimated, because of ice, by Prof. E. F. Chandler, from climatologic records, discharge of adjacent drainage areas, and observer's notes concerning any marked variation in discharge, as follows: Jan. 1-31, 0.4 second-foot; Feb. 1-29, 0.2 second-foot; Mar. 1-31, 0.5 second-foot; Apr. 1-6, 42 second-feet, varying from about 1 to 62 second-feet. It should be noted that these estimates are based on less data than estimates at most stations in this report and that they simply represent the best values available for publication. Discharge Nov. 18-30 estimated, because of ice, from gage heights and climatologic records at 27 second-feet, varying from about 49 to 10 second-feet.

Monthly discharge of West Branch of Roseau River near Malung, Minn., for 1912.

[Drainage area, 265 square miles. [a]]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January			0.4	
February			.2	
March			.5	
April			20.5	C.
May	33	8.7	17.3	B.
June	12	2.2	5.60	C.
July	3.8	.8	2.09	D.
August	6.6	2.2	3.21	D.
September	900	2.2	120	C.
October	1,040	55	318	C.
November	115		58.0	C.

[a] "Second-feet per square mile" and "Run-off (depth in inches)" are not published for this station because the large number of swamps, some of which are artificially drained, in the drainage area render such values misleading.

NOTE.—See footnote to table of daily discharge.

MOUSE RIVER AT MINOT, N. DAK.

Location.—At the Anne Street footbridge northeast of the Great Northern Railway roundhouse at Minot, N. Dak.

Records available.—May 5, 1903, to December 31, 1912.

Drainage area.—8,400 square miles.

Gage.—Vertical staff attached to pier of the Anne Street Bridge. The original gage, superseded in 1910 by this gage, was at a bridge about 40 rods farther upstream. At low stage, because the water is ponded by a dam below, there is no appreciable slope in the water surface and the gage zeros at the old and present sites have the same elevation; at high stage there is a slight slope in the water surface; hence, at highest stage the present gage would read slightly less than the original gage would have done, but the difference is probably less than 0.1 foot, even at extreme high water. Datum unchanged.

Channel.—Clay and silt; slightly shifting.

Discharge measurements.—Made from the Anne Street Bridge at medium and high stages. At low stage made by wading some rods below the dam at the Minneapolis, St. Paul & Sault Ste. Marie Railway water tank.

Winter flow.—The relation of gage height to discharge is somewhat affected by ice from about the middle of November to the middle of April; if the river is low enough to be controlled at the gage entirely by the weir formula due to the dam, the effect of the ice is not so considerable. In most winters the discharge is very small, as has been found by actual discharge measurements occasionally. Thus, from a few gage readings each winter estimates of flow may be made which are not in error to the amount of a large quantity of water.

Artificial control.—A dam 4 feet high at the Minneapolis, St. Paul & Sault Ste. Marie Railway water tank, 1 mile below the gage (along the channel), raises the water at the gage about 3 feet at ordinary low stage. The dam has no sluices, being designed merely to give enough depth of water for the intake-pipe suction; but it is not absolutely tight. When the discharge is less than about 6 second-feet the water level falls below the crest of the dam. The crest of the dam is nearly level and can be considered as a broad-crested weir until (at gage reading about 6 feet) corrections for submergence of the weir by the filling of the channel below the weir need be applied. The dam was raised about 0.7 foot in March, 1911; previous to that time ordinary low-water level at the gage was 0.7 foot less than now.

Accuracy.—The percentage errors of the results for the low-water period may be largely due to small errors by the gage observer and the undetermined leakage through the dam, although the error is but a few second-feet. At medium stages the results are good.

Discharge measurements of Mouse River at Minot, N. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 9	George Ebner	7.10	613
10	do	7.12	581
Sept. 13[a]	E. F. Chandler	4.41	16.0

[a] Wading measurement.

Daily gage height, in feet, of Mouse River at Minot, N. Dak., for 1912.

[Ephraim Cox and F. G. Bennewitz, observers.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	6.5	5.8	6.7	4.8	4.75	4.65	4.55	4.8
2	....	6.4	5.7	6.6	4.8	4.7	4.65	4.5	4.8
3	....	6.4	5.65	6.4	4.8	4.7	4.6	4.5	4.75
4	....	6.4	5.6	6.4	4.8	4.7	4.6	4.5	4.75
5	....	6.4	5.65	6.4	4.8	4.7	4.55	4.5	4.7
6	....	6.5	5.8	6.4	4.8	4.7	4.55	4.5	4.7
7	....	6.9	5.75	6.2	4.8	4.7	4.55	4.5	4.7
8	....	7.1	5.8	6.1	4.8	4.7	4.55	4.5	4.7
9	....	7.1	5.85	6.0	4.8	4.7	4.55	4.55	4.7
10	....	7.2	5.9	5.9	4.8	4.7	4.55	4.6	4.7
11	....	7.4	5.9	5.8	4.8	4.7	4.5	4.65	4.7
12	....	7.6	6.0	5.7	4.8	4.7	4.5	4.7	4.7
13	....	7.7	6.1	5.6	4.8	4.65	4.5	4.75	4.65
14	....	7.8	6.2	5.5	4.8	4.65	4.5	4.75	4.65
15	....	8.6	6.4	5.45	4.8	4.65	4.5	4.8	4.65
16	....	9.0	6.6	5.45	4.75	4.6	4.5	4.8	4.65
17	....	9.5	6.8	5.4	4.75	4.6	4.5	4.75	4.65
18	....	9.9	7.1	5.4	4.75	4.6	4.5	4.75	4.65
19	....	10.2	7.4	5.3	4.75	4.6	4.5	4.75	4.65
20	....	10.4	7.7	5.25	4.75	4.6	4.5	4.75	4.65
21	....	10.1	8.1	5.2	4.75	4.6	4.5	4.75	4.6
22	....	9.7	8.7	5.1	4.75	4.6	4.55	4.75	4.6
23	....	8.6	8.8	5.05	4.8	4.6	4.55	4.7	4.6
24	4.85	7.4	8.9	5.0	4.8	4.6	4.6	4.7	4.6
25	4.95	7.1	8.8	5.0	4.8	4.6	4.65	4.7	4.6
26	5.2	6.8	8.0	5.0	4.8	4.55	4.7	4.7	4.6
27	5.35	6.5	7.5	4.95	4.8	4.55	4.7	4.7	4.6
28	5.55	6.3	7.1	4.9	4.8	4.55	4.7	4.75	4.6
29	5.95	6.1	6.9	4.8	4.8	4.55	4.7	4.75	4.6
30	6.4	5.9	6.8	4.8	4.8	4.6	4.7	4.75	4.6
31	6.6	....	6.7	....	4.75	4.65	....	4.8	....

NOTE.—Severe ice conditions existed during the winter months and no gage heights were read. The records from Mar. 24 to 31 and from Nov. 14 to 31 are believed to have been affected by ice. On Feb. 15 the observer reported that there was no water running.

Daily discharge, in second-feet, of Mouse River at Minot, N. Dak., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	450	282	498	69	60	44	30	69
2	....	426	258	474	69	52	44	24	69
3	....	426	246	426	69	52	36	24	60
4	....	426	235	426	69	52	36	24	60
5	....	426	246	426	69	52	30	24	52
6	....	450	282	426	69	52	30	24	52
7	....	546	270	378	69	52	30	24	52
8	....	594	282	354	69	52	30	24	52
9	....	594	294	330	69	52	30	30	52
10	....	618	306	306	69	52	30	36	52
11	....	666	306	282	69	52	24	44	52
12	....	714	330	258	69	52	24	52	52
13	....	737	354	235	69	44	24	60	44
14	....	760	378	212	69	44	24	60	36
15	....	929	426	201	69	44	24	69	36
16	....	1,000	474	201	60	36	24	69	36
17	....	1,080	522	190	60	36	24	60	36
18	....	1,140	594	190	60	36	24	60	36
19	....	1,180	666	168	60	36	24	60	36
20	....	1,200	737	158	60	36	24	60	36

Daily discharge, in second-feet, of Mouse River at Minot, N. Dak., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21	....	1,160	827	147	60	36	24	60	30
22	....	1,110	947	126	60	36	30	60	30
23	....	929	965	116	69	36	30	52	30
24	13	666	983	106	69	36	36	52	30
25	20	594	965	106	69	36	44	52	30
26	52	522	805	106	69	30	52	52	30
27	78	450	690	96	69	30	52	52	30
28	136	402	594	87	69	30	52	60	30
29	246	354	546	69	69	30	52	60	30
30	390	306	522	69	69	36	52	60	30
31	450	....	498	....	60	44	....	69	....

NOTE.—Discharge determined from a rating curve that is fairly well defined for medium and high stages. Discharges from Mar. 24 to 31 and from Nov. 14 to 30 were estimated from observer's notes and weather reports. The flow previous to about Mar. 20 was very low and is believed to have been 1 second-foot or less. The mean flow during December was probably about 10 or 15 second-feet.

Monthly discharge of Mouse River at Minot, N. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 24-31	450	13	173	2,750	D.
April	1,200	306	695	41,400	B.
May	983	235	511	31,400	B.
June	498	69	239	14,200	B.
July	69	60	66.7	4,100	C.
August	60	30	42.7	2,630	C.
September	52	24	33.5	1,990	C.
October	69	24	48.0	2,950	C.
November	69	30	42.3	2,520	C.
The period	....	....	....	104,000	

EVAPORATION AT UNIVERSITY, N. DAK.[1]

The evaporation gage at University, N. Dak., was established April 17, 1905. It is located on a pool in a ravine called English Coulee, which runs through the campus of the University of North Dakota, which is immediately west of Grand Forks, N. Dak., and 2 miles west of the Minnesota boundary.

The records at this station were continued in 1912, daily observations being made during the entire open season, except the first 10 days. The gage was protected from disturbance, and the records of observations are reliable.

The coulee drains about 60 square miles of very level prairie. Except for brief freshets the flow in the coulee is small, varying from 1 second-foot or less to 20 second-feet. In very dry weather the water lies in pools with scarcely any perceptible flow.

A heavy galvanized-iron tank, 3 feet square and 18 inches deep, is placed in the center of an anchored raft, so that the water in the tank is at the same level as the water surface outside. The tank is filled nearly to the top, to a height precisely marked by the pointed tip of a vertical rod in the center of the tank. Once each day, after the change produced by evaporation or rainfall, the water level is restored to the original height, the precise amount of water transferred being measured with a cup of such size that one cupful of water is equivalent to 0.01 inch depth in the tank.

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[1] For complete description of this station and records of evaporation, rainfall, and temperature for 1905 to 1908, see U. S. Geol. Survey Water-Supply Paper 245, pp. 64-67, 1910.

A standard rain gage is located on the open prairie about 10 rods distant. On days of rainfall the difference (which is usually small) between the quantity measured by the rain gage and the surplus in the tank is considered the total evaporation for the day.

Observations were made usually about half an hour before sunset. The temperature of the water recorded is the observation of the water in the tank; as the tank is a metal tank, it has been found that at that time of the day there is rarely a perceptible difference in temperature reading between the water within and without the tank. The temperature of the air as recorded is the mean of the readings of the standard self-recording maximum and the self-recording minimum thermometers for the preceding 24 hours.

The following table shows for each 10-day period during 1912 the gross evaporation, the total rainfall, and the mean temperatures for the 10 observations of the water and of the air.

Evaporation, rainfall, and temperature at University, N. Dak., for 1912.

[T. T. Quirke and Thos. G. Johnson, observers.]

Date.	Evaporation.	Rainfall.	Mean temperature.		Date.	Evaporation.	Rainfall.	Mean temperature.	
			Water.	Air.				Water.	Air.
	Inches.	*Inches.*	°F.	°F.		*Inches.*	*Inches.*	°F.	°F.
Apr. 19-20	0.19	0.00	54	43	Aug. 11-20	1.32	0.75	68	62
21-30	.75	.78	49	44	21-31	1.38	.98	65	62
May 1-10	1.84	1.85	54	51	Sept. 1-10	1.41	1.66	68	67
11-20	1.20	.16	57	50	11-20	1.33	1.10	57	52
21-31	1.94	.91	64	61	21-30	1.49	2.40	44	42
June 1-10	1.52	.00	63	57	Oct. 1-10	.57	.26	47	50
11-20	1.63	.06	68	59	11-20	.61	.00	42	48
21-30	2.64	.00	84	73	21-31	.48	.03	37	40
July 1-10	1.97	2.71	77	70	Nov. 1- 9	.15	.05	32	33
11-20	1.86	1.17	69	61					
21-31	1.93	1.41	73	69					
Aug. 1-10	1.24	.97	67	61	Total for period	27.45	17.25		

RAINY RIVER AT INTERNATIONAL FALLS, MINN.

Location.—At the steamboat dock half a mile below the dam at International Falls.

Records available.—March 1, 1907, to December 31, 1912.

Drainage area.—14,600 square miles.

Gage.—Vertical staff installed by the United States Geological Survey April 20, 1911, at the American steamboat dock below the falls. Prior to this date gage heights furnished through the courtesy of the Minnesota & Ontario Power Co. were read on a gage located just below the dam, first on the Canadian side but later on the American side. The zero of the Survey gage is 460.99 feet above that of the power company's gage, when the slope[1] of the river between the two points is considered.

Channel.—Practically permanent.

Discharge measurements.—Discharge measurements prior to 1911 were made by means of a boat and cable at a section several hundred yards below the gage, where an island divides the river into two channels. Since 1911 measurements have been made above the island, where the river flows in one channel and the velocities are better distributed.

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[1] Slope determined at gage height 2.65 feet.

Winter flow.—Ice rarely forms in the long stretch of water below the dam, but it does form at the rapids below the open stretch, causing serious backwater at the gage, amounting at times to more than 2 feet. During 1909 and 1910 the monthly flow during the winter has been estimated indirectly from records of flow through the turbines as kept by the power company. During 1911 and 1912 the winter flow has been estimated directly from records of flow through the turbines as computed by the Canadian Department of Public Works. Winter estimates for periods previous to 1910 can be considered only approximate.

Artificial control.—The dam above the gaging station raises the water level in Rainy Lake to such an extent as to cause a large increase in the storage. Since the dam and power house have been in operation practically no water has passed over the crest, the entire flow of the river going through the turbines and sluice gates. The plant is run on a 24-hour basis, however, so that with the exception of the Sunday flow the discharge is fairly uniform, though it does not represent the natural flow.

Accuracy.—Studies of the records at this station made by Mr. Adolph Meyer, consulting engineer of the International Joint Commission, based on more complete data than were available when Water-Supply Paper 305 and the report of the water resources investigations of Minnesota for 1909–1912 were prepared, indicate that the estimates of monthly discharge published in those reports are in error. The percentage of error deduced by comparison with Mr. Meyer's results is as follows:

Estimated errors in published tables of monthly discharge.

Year.	Period.	Error (per cent).	Year.	Period.	Error (per cent).
1907	March and April	+12	1909	January and February	+16
	May	+40		April to May	−11
	August to November	−12 to −14		December	−50
1908	February to April	+27 to +37	1910	January to March	−50 to −57
	May	+60		November	+14
	June	+19	1911	April	+20
	July to September	+8		June	+10
	December	−14			

Values for all other months, 1907–1912, are within the accuracy ratings as published.

Cooperation.—Estimates of flow through the power house and results of discharge measurements furnished by Canadian Department of Public Works. Results of current-meter measurements by the Canadian Department of the Interior, water-power branch.

Discharge measurements of Rainy River at International Falls, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 20[a]	S. B. Soulé	3.99	6,090	Aug. 5	S. S. Scovil [b]	4.16	[d] 9,080
Feb. 16[a]	A. A. Anderson [b]	3.18	5,680	7	Hoyt and Soulé	4.46	9,960
Mar. 13[a]	W. J. Stewart [b]	2.72	5,040	Sept. 3	A. Pierce [b]	3.33	[d] 7,700
May 7[c]	.....do	3.38	6,980	9	.....do	3.33	[d] 7,760
June 1	.....do	2.62	6,680	19	[e]	2.65	[d] 6,440
13	S. B. Soulé	2.26	5,880	Oct. 2	A. Pierce [b]	2.23	[d] 5,160
July 23	W. J. Stewart [b]	3.80	8,880	Nov. 6	R. H. Nelson [b]	2.88	[d] 6,420

[a] River open at measuring section. Backwater at gage from ice below.

[b] Canadian engineers.

[c] Backwater from Big Fork and Little Fork rivers.

[d] The results of these measurements were not available when the computations and studies of the discharge data for this station were made. The measurements were made with current meters which had to be rerated before the results could be obtained.

[e] Canadian Department of Public Works.

Daily gage height, in feet, of Rainy River at International Falls, Minn., for 1912.

[Robert Caple, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.7	3.1	3.1	1.40	3.0	2.6	1.70	4.6	2.4	3.4	2.8	2.8
2	3.0	3.6	3.1	1.8	2.9	2.2	2.0	4.7	2.1	3.3	2.8	3.6
3	3.4	3.9	2.5	1.8	2.8	2.5	2.0	4.7	2.5	3.2	2.2	4.0
4	3.4	3.0	2.4	1.85	3.0	2.5	1.65	4.2	3.5	3.1	2.1	4.0
5	3.4	2.8	3.0	1.7	2.4	2.5	1.80	4.1	3.6	3.2	2.9	4.0
6	3.4	3.3	3.0	1.6	2.5	2.5	2.0	4.3	3.8	2.7	2.9	4.0
7	3.0	3.5	2.9	.55	3.5	2.5	1.55	4.5	3.6	2.8	2.9	3.8
8	2.5	3.4	3.0	1.10	3.9	2.4	1.9	4.4	3.4	2.9	2.9	3.4
9	3.4	3.4	3.1	1.7	3.8	2.1	2.6	4.3	3.4	3.0	2.8	3.4
10	3.7	3.3	2.4	2.0	4.0	2.2	2.8	4.3	3.7	3.0	2.2	4.3
11	3.8	2.8	2.2	2.0	3.9	2.4	3.3	3.8	3.6	3.0	2.2	4.1
12	4.1	2.8	2.8	2.0	3.1	2.4	3.2	3.6	3.4	3.1	2.6	4.5
13	4.2	3.4	2.7	2.0	2.8	2.3	3.3	3.5	3.4	2.5	2.8	4.5
14	2.0	3.4	2.7	1.5	3.7	2.3	2.9	3.5	3.4	2.8	2.8	4.4
15	3.1	3.3	2.8	1.3	3.9	2.2	3.0	3.4	2.8	2.9	2.8	3.6
16	3.7	3.2	2.6	2.1	3.9	1.9	3.6	2.7	3.0	2.9	2.7	3.4
17	3.9	3.0	1.80	1.9	3.8	2.0	3.8	3.0	3.2	2.8	2.2	4.2
18	3.9	2.3	1.70	1.85	3.6	2.1	3.4	2.9	3.0	2.8	2.4	4.3
19	3.9	2.1	2.2	1.85	2.6	2.1	2.7	3.1	2.7	2.9	2.8	4.4
20	4.0	2.7	2.6	1.9	2.5	2.2	3.2	3.5	2.7	2.5	2.8	4.4
21	3.2	2.9	2.6	1.05	3.3	2.2	3.6	3.3	2.4	2.2	3.0	4.2
22	3.0	2.9	2.7	.9	3.2	2.4	3.6	2.8	2.3	2.7	2.9	3.3
23	3.8	2.9	2.6	1.75	3.2	2.0	3.8	2.6	2.3	2.8	2.8	3.2
24	3.9	2.8	1.7	1.9	3.3	2.0	3.9	2.7	2.6	2.8	2.3	3.4
25	3.8	2.2	1.9	2.0	3.0	2.2	3.9	2.3	3.2	2.8	2.3	3.0
26	3.8	2.4	2.2	2.2	1.9	2.0	3.9	2.6	4.4	2.8	2.7	2.8
27	3.6	3.0	2.3	2.4	2.1	2.0	3.9	2.4	4.0	2.1	2.8	3.5
28	2.7	3.1	2.2	1.9	2.7	1.9	3.8	2.6	3.5	2.1	2.8	3.2
29	2.3	3.1	2.0	1.9	2.7	1.9	4.6	2.6	3.2	2.7	2.8	3.2
30	3.2	......	1.9	2.8	2.6	1.5	4.6	2.8	3.4	2.8	2.7	3.1
31	3.2	......	1.30	......	2.6	......	4.6	2.7	......	2.8	......	3.8

NOTE.—Relation of gage height to discharge affected by backwater about Jan. 1 to May 31 and about Dec. 1 to 31.

Daily discharge, in second-feet, of Rainy River at International Falls, Minn., for 1912.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	6,650	5,300	10,200	6,330	7,990	6,970	16	5,580	8,350	6,810	7,300	7,130	6,810
2	6,020	5,720	10,400	5,870	7,810	6,970	17	5,720	8,720	7,300	7,640	6,970	6,020
3	6,490	5,720	10,400	6,490	7,640	6,020	18	5,870	7,990	7,130	7,300	6,970	6,330
4	6,490	5,230	9,480	8,170	7,470	5,870	19	5,870	6,810	7,470	6,810	7,130	6,970
5	6,490	5,440	9,290	8,350	7,640	7,130	20	6,020	7,640	8,170	6,810	6,490	6,970
6	6,490	5,720	9,670	8,720	6,810	7,130	21	6,020	8,350	7,810	6,330	6,020	7,300
7	6,490	5,100	10,000	8,350	6,970	7,130	22	6,330	8,350	6,970	6,170	6,810	7,130
8	6,330	5,580	9,860	7,990	7,130	7,130	23	5,720	8,720	6,650	6,170	6,970	6,970
9	5,870	6,650	9,670	7,990	7,300	6,970	24	5,720	8,910	6,810	6,650	6,970	6,170
10	6,020	6,970	9,670	8,530	7,300	6,020	25	6,020	8,910	6,170	7,640	6,970	6,170
11	6,330	7,810	8,720	8,350	7,300	6,020	26	5,720	8,910	6,650	9,860	6,970	6,810
12	6,330	7,640	8,350	7,990	7,470	6,650	27	5,720	8,910	6,330	9,100	5,870	6,970
13	6,170	7,810	8,170	7,990	6,490	6,970	28	5,580	8,720	6,650	8,170	5,870	6,970
14	6,170	7,130	8,170	7,990	6,970	6,970	29	5,580	10,200	6,650	7,640	6,810	6,970
15	6,020	7,300	7,990	6,970	7,130	6,970	30	5,030	10,200	6,970	7,990	6,970	6,810
							31	......	10,200	6,810	......	6,970	......

NOTE.—Daily discharge June 1 to Nov. 30 computed from a rating curve well defined between 3,820 and 12,000 second-feet (gage heights 0.5 and 5.5 feet) and from daily gage heights obtained by the United States Geological Survey. This rating curve, as the result of additional data, differs from that used in Water-Supply Paper 305 for 1907-1911 by the following amounts in per cent, referred to the 1912 curve:

Discharge.	Gage height.	Difference.	Discharge.	Gage height.	Difference.
Second-feet.	*Feet.*	*Per cent.*	*Second-feet.*	*Feet.*	*Per cent.*
3,300	0.0	+ 5	9,100	4.0	+ 3
4,380	1.0	− 2	11,000	5.0	+ 5
5,720	2.0	− 2	13,000	6.0	+ 8
7,300	3.0	0	15,200	7.0	+10

NOTE.—For daily discharge values for entire year see record furnished by the Canadian department of public works. See also table of daily discharge furnished by S. B. Johnson, hydraulic engineer, Department of Public Works, Canada.

Monthly discharge of Rainy River at International Falls, Minn., for 1912.

[Drainage area, 14,600 square miles.][a]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
June	6,650	5,030	6,030	A.
July	10,200	5,100	7,580	A.
August	10,400	6,170	8,110	A.
September	9,860	5,870	7,590	A.
October	7,990	5,870	7,010	A.
November	7,300	5,870	6,740	A.

[a] Discharge in "second-feet per square mile" and "Run-off (depth in inches)" are not published for this drainage area, because such values are believed to be misleading in that they do not represent the natural flow at this station. See "Artificial control."

NOTE.—This table was computed from discharge values obtained entirely from the interpretation of the base data at this gaging station by engineers of the United States Geological Survey. See also table computed from daily discharge furnished by S. B. Johnson, hydraulic engineer, Department of Public Works, Canada.

Daily discharge, in second-feet, of Rainy River at International Falls, Minn., for 1912.

[Canadian Department of Public Works.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,490	5,085	4,856	3,953	5,880	6,315	6,078	10,091	6,448	7,279	7,087	5,801
2	5,695	5,440	4,888	5,022	5,885	5,440	5,650	10,072	5,892	7,202	7,122	6,433
3	5,665	5,845	4,197	5,028	5,915	5,235	5,940	10,077	6,470	7,039	6,184	6,725
4	5,695	4,620	4,102	4,997	6,190	6,370	5,460	9,462	8,408	7,089	6,095	7,001
5	5,640	3,995	5,101	5,002	5,250	6,382	5,150	8,953	8,498	7,078	7,199	6,968
6	5,815	5,105	5,037	4,984	4,795	6,410	5,540	9,825	8,363	6,199	7,146	6,655
7	4,450	5,090	5,090	3,725	6,185	6,305	5,394	9,837	7,997	6,543	7,100	6,149
8	3,995	5,050	5,102	3,616	6,570	6,159	5,835	9,714	7,254	7,060	7,073	5,828
9	5,725	4,985	5,063	5,049	6,600	5,971	6,932	9,333	7,266	7,060	6,791	5,860
10	5,720	4,870	4,205	5,068	6,692	5,889	7,064	9,332	8,057	7,039	6,175	6,913
11	5,725	4,105	4,108	5,096	6,734	6,267	7,480	8,442	7,962	7,045	5,998	6,973
12	5,940	3,990	5,105	5,119	5,435	6,239	7,760	8,299	7,799	7,100	6,568	6,972
13	6,220	5,030	5,060	5,052	4,800	6,283	7,910	8,208	7,831	[a]6,880	6,923	6,962
14	3,700	5,035	5,025	4,031	6,690	6,312	7,576	8,246	7,880	6,664	7,020	6,675
15	5,030	5,000	5,046	4,409	6,695	6,255	7,494	7,965	7,260	7,083	6,955	5,412
16	5,855	5,009	4,960	5,100	6,690	5,570	8,613	7,048	7,234	7,044	7,041	5,532
17	5,930	5,017	3,828	5,060	6,350	5,730	8,835	7,528	7,812	7,047	5,261	7,267
18	5,900	4,119	3,890	5,045	6,355	6,042	8,148	7,720	7,479	6,852	6,511	6,987
19	5,915	3,976	4,812	5,055	4,855	6,093	6,981	7,530	6,996	6,987	6,999	6,850
20	5,915	5,035	5,045	5,048	5,200	6,180	7,604	8,416	6,923	6,594	7,015	6,989
21	4,700	5,044	5,096	4,130	6,730	6,261	8,633	8,194	6,588	5,824	7,089	6,762
22	4,320	5,057	5,095	3,950	6,743	6,415	8,405	6,865	5,910	7,076	7,033	5,900
23	5,915	5,063	5,004	5,045	6,720	5,823	8,936	6,728	6,063	7,111	7,050	4,650
24	5,920	5,014	3,560	5,055	6,770	5,693	9,012	6,932	6,930	7,070	6,174	6,581
25	5,875	4,169	4,429	5,385	6,577	6,190	8,940	5,885	7,315	7,056	5,978	5,011
26	5,760	4,080	5,070	5,800	4,892	5,835	9,061	6,166	8,892	7,078	7,002	4,591
27	5,495	5,068	5,022	5,900	5,175	5,969	9,105	6,614	8,223	6,135	7,064	5,995
28	4,255	5,066	5,057	4,597	6,680	5,853	8,572	6,839	7,179	5,927	7,047	6,549
29	3,935	5,056	5,090	4,348	6,495	5,775	9,946	7,055	6,980	6,968	6,687	5,762
30	5,080	....	4,910	5,865	6,350	5,267	9,979	7,152	7,024	7,076	6,422	5,137
31	5,085	....	4,012	....	5,776	....	10,087	7,177	....	7,112	....	6,751

[a] Interpolated by engineers of United States Geological Survey.

NOTE.—Daily discharge record furnished by S. B. Johnson, hydraulic engineer, department of public works, Canada, and were computed from power-house records. See also table of daily discharge June 1 to Nov. 30, 1912, computed from United States Geological Survey gage records.

Monthly discharge of Rainy River at International Falls, Minn., for 1912.

[Drainage area, 14,600 square miles.] [a]

Month.	Discharge in second-feet.			Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.		Maximum.	Minimum.	Mean.
January	6,220	3,700	5,330	August	10,100	5,860	8,120
February	5,840	3,980	4,830	September	8,890	5,890	7,300
March	5,100	3,560	4,740	October	7,280	5,820	6,940
April	5,900	3,620	4,850	November	7,200	5,260	6,730
May	6,770	4,800	6,090	December	7,270	4,590	6,280
June	6,420	5,240	6,020				
July	10,100	5,150	7,680	The year	10,100	3,560	6,250

[a] "Discharge in second-feet per square mile" and "Run-off (depth in inches)" are not published for this drainage area, because such values are believed not to represent the natural flow at this station. See "Artificial control" in station description.

NOTE.—Discharge computed by engineers of the United States Geological Survey from the daily discharge record furnished by S. B. Johnson, hydraulic engineer, Department of Public Works, Canada.

RAINY LAKE AT RANIER, MINN.

Location.—At the foot of Rainy Lake at the foot of the Ranier wharf.

Records available.—January 1, 1910, to December 31, 1912.

Gage.—Vertical staff. Prior to August 19, 1911, the gage heights were taken at the upper gage of the Minnesota & Ontario Power Co., just above the dam at International Falls, 2 miles below Ranier. Comparative readings taken on the two gages during 1911 indicated a slope of 0.50 foot between the two points, and, to make the records at the two points comparable the readings on the Minnesota & Ontario gage were reduced by 488.50 feet. Recent studies by Mr. Meyer, an engineer of the International Joint Commission, indicate that the actual slope between the two gages varied from 0.3 to 1.2 feet during the period January 1, 1910, to August 18, 1911, so that the readings on the Minnesota & Ontario Power Co.'s gage should have been reduced by an amount ranging from 488.70 to 487.80 feet instead of by 488.50 feet. Gage heights from January 1, 1910, to August 18, 1911, published in Water-Supply Papers 285 and 305 are therefore in error as referred to the correct datum by an unknown amount varying from +0.2 to −0.7 foot. The dam at International Falls controls the level of Rainy Lake which has an area of approximately 344 square miles. Owing to the great number of small islands in the lake its effective capacity is somewhat uncertain, as the existing maps are too small to show this accurately. Beginning August 19, 1911, the gage heights refer to the gage established by the Canadian Department of Public Works. The 1912 gage heights have been referred to the original datum of the gage which had its elevation 489.00 feet above that of the Minnesota & Ontario Power Co.'s gage. The gage was maintained at the following elevations during 1912:

	Feet.
Jan. 1 to Sept. 21	489.00
Sept. 22 to Oct. 9	488.77
Oct. 15 to Dec. 31	489.25

The records at this station, by indicating the change of water level, show the gain or loss in storage due to the control of the flow at the International Falls dam, and when used in connection with the records of the flow of the Rainy at International Falls are of value in determining the natural run-off.

Cooperation.—Gage is owned and maintained by the Canadian Department of Public Works.

Daily gage height, in feet, of Rainy Lake at Ranier, Minn., for 1912.

[G. A. Schiller, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.12	2.36	1.74	0.91	1.41	3.91	6.45	7.38	7.34	7.28	7.03	6.45
2	3.10	2.32	1.72	.87	1.48	4.06	6.50	7.34	7.33	7.26	7.02	6.45
3	3.08	2.30	1.70	.83	1.56	4.12	6.56	7.31	7.36	7.26	7.01	6.45
4	3.06	2.28	1.68	.81	1.61	4.24	6.61	7.29	7.36	7.27	7.00	6.41
5	3.04	2.26	1.64	.80	1.71	4.34	6.66	7.30	7.38	7.27	6.98	6.37
6	3.02	2.24	1.62	.78	1.75	4.42	6.68	7.32	7.39	7.25	6.98	6.35
7	3.00	2.22	1.59	.78	1.77	4.54	6.78	7.31	7.34	7.25	6.96	6.33
8	2.98	2.20	1.56	.79	1.89	6.62	6.83	7.29	7.41	7.26	6.86	6.31
9	2.96	2.20	1.54	.75	2.01	4.71	6.86	7.28	7.32	7.27	6.92	6.28
10	2.94	2.19	1.52	.75	2.08	4.81	6.88	7.26	7.30	......	6.90	6.25
11	2.92	2.18	1.50	.75	2.16	4.92	6.91	7.24	7.29	......	6.90	6.22
12	2.90	2.18	1.48	.75	2.24	5.00	6.98	7.18	7.28	......	6.89	6.19
13	2.88	2.16	1.45	.76	2.31	5.05	7.02	7.15	7.28	......	6.87	6.16
14	2.86	2.12	1.41	.78	2.37	5.12	7.03	7.20	7.26	......	6.84	6.12
15	2.84	2.10	1.37	.78	2.46	5.21	7.02	7.20	7.27	7.25	6.81	6.10
16	2.81	2.08	1.33	.82	2.55	5.28	7.06	7.22	7.56	7.23	6.77	6.09
17	2.76	2.06	1.31	.87	2.57	5.38	7.08	7.27	7.24	7.25	6.75	6.07
18	2.72	2.05	1.30	.90	2.66	5.48	7.08	7.24	7.20	7.19	6.73	6.05
19	2.69	2.04	1.27	.91	2.80	5.58	7.09	7.23	7.21	7.20	6.73	6.03
20	2.64	2.03	1.23	.91	2.88	5.65	7.16	7.22	7.17	7.23	6.71	6.01
21	2.63	2.02	1.20	.93	2.96	5.72	7.19	7.19	7.17	7.17	6.65	5.99
22	2.62	2.00	1.18	.95	3.02	5.78	7.23	7.20	7.09	7.16	6.65	5.98
23	2.60	1.98	1.16	.97	3.10	5.83	7.28	7.22	7.11	7.15	6.65	5.97
24	2.56	1.96	1.14	.99	3.21	5.90	7.28	7.27	......	7.11	6.61	5.95
25	2.54	1.91	1.11	1.03	3.26	6.00	7.28	7.27	......	7.10	6.59	5.93
26	2.50	1.86	1.07	1.10	3.42	6.06	7.29	7.27	7.24	7.09	6.55	5.91
27	2.48	1.81	1.03	1.20	3.55	6.14	7.29	7.26	7.26	7.08	6.53	5.89
28	2.45	1.78	1.00	1.22	3.66	6.19	7.40	7.30	7.26	7.07	6.49	5.87
29	2.42	1.76	.98	1.29	3.71	6.27	7.39	7.31	7.27	7.05	6.41	5.85
30	2.40	......	.96	1.35	3.76	6.42	7.38	7.33	7.27	7.05	6.44	5.85
31	2.38	......	.93	......	3.81	......	7.38	7.33	......	7.05	......	5.83

NOTE.—Gage heights here published refer to the same datum, the readings Sept. 21 to Oct. 9 having been corrected by −0.23 foot and Oct. 15 to Dec. 31 by +0.25 foot because the original elevation of the datum of the gage was 489.00 feet and the elevation of the zero of gage was changed on Sept. 21 to 488.77 feet, remained at that elevation until Oct. 9, and on Oct. 15 was changed to 489.25 feet. These changes were made by the Canadian Department of Public Works. On Oct. 10 the observer reported: "Gage out of commission."

VERMILION RIVER BELOW LAKE VERMILION, NEAR TOWER, MINN.

Location.—Just below the dam at outlet of Lake Vermilion in sec. 2, T. 63 N., R. 17 W., in St. Louis County, 4 miles above the mouth of Two Mile Creek, which enters from the west.

Records available.—May 17, 1911, to December 31, 1912.

Drainage area.—507 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from car and cable just below the gage section.

Artificial control.—At the outlet of Vermilion Lake, a few hundred feet above the gage, there is a dam which is used to raise the elevation of the lake for aid in navigation. There are no gates in the dam, but on July 19, 1912, it was repaired. For a period after this date the flow was lower than normal as there was less leakage. The lake has a slightly greater storage capacity, at the present time, so that the flow during the winter period of 1912–13 will probably be somewhat larger than it would have been had not the dam been repaired.

Winter flow.—Owing to the heavy fall at the gage section, amounting to 20 feet in 200 yards, there is little or no backwater from ice during the winter months.

Accuracy.—Conditions are favorable for fairly accurate results, the only uncertainty being some inaccuracy in the discharge measurements owing to the very rocky section.

Discharge measurements of Vermilion River below Lake Vermilion, near Tower, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 16[a]	S. B. Soulé	0.60	140	Mar. 7[a]	W. G. Hoyt	0.52	103
Mar. 7[a]	do	.52	97.6	Oct. 16	S. B. Soulé	.58	105

[a] Open water; regular section.

Daily gage height, in feet, of Vermilion River below Lake Vermilion, near Tower, Minn., for 1912.

[C. M. Everett, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.70	0.65	0.54	0.45	1.10	2.0	1.55	0.65	0.55	0.6	0.5	0.5
2	.70	.65	.52	.45	1.2	2.0	1.5	.65	.55	.6	.5	.5
3	.70	.65	.52	.45	1.3	2.0	1.5	.65	.55	.6	.5	.5
4	.70	.65	.52	.45	1.4	1.95	1.45	.6	.55	.6	.5	.5
5	.70	.65	.52	.45	1.5	1.95	1.4	.6	.6	.6	.5	.5
6	.70	.65	.52	.45	1.6	1.95	1.4	.6	.6	.6	.5	.5
7	.70	.65	.52	.45	1.7	1.9	1.4	.6	.6	.6	.5	.5
8	.70	.65	.50	.48	1.75	1.9	1.35	.6	.6	.6	.5	.5
9	.70	.65	.50	.50	1.8	1.9	1.35	.55	.6	.6	.5	.5
10	.70	.65	.50	.50	1.9	1.9	1.3	.55	.6	.6	.5	.5
11	.70	.64	.50	.50	1.9	1.95	1.25	.55	.6	.6	.5	.5
12	.70	.63	.50	.52	2.0	1.95	1.25	.55	.6	.6	.5	.5
13	.70	.63	.50	.54	2.0	1.9	1.25	.55	.6	.6	.5	.5
14	.70	.62	.46	.55	2.05	1.85	1.3	.5	.6	.6	.5	.5
15	.70	.62	.44	.55	2.05	1.85	1.25	.5	.6	.6	.5	.5
16	.70	.61	.42	.55	2.05	1.8	1.25	.5	.6	.6	.5	.5
17	.70	.61	.42	.57	2.05	1.8	1.25	.5	.6	.6	.5	.5
18	.68	.60	.42	.60	2.05	1.8	.8	.5	.6	.6	.5	.5
19	.68	.60	.42	.63	2.1	1.8	.8	.5	.6	.6	.5	.5
20	.68	.60	.42	.65	2.1	1.75	.7	.5	.6	.55	.5	.5
21	.68	.60	.42	.68	2.1	1.75	.7	.5	.6	.55	.5	.5
22	.65	.60	.42	.70	2.1	1.75	.7	.5	.6	.55	.5	.5
23	.65	.60	.42	.70	2.05	1.75	.7	.5	.6	.55	.5	.5
24	.65	.60	.42	.70	2.05	1.7	.7	.5	.6	.55	.5	.5
25	.65	.60	.42	.75	2.05	1.7	.65	.5	.6	.55	.5	.5
26	.65	.60	.43	.80	2.05	1.65	.65	.55	.6	.55	.5	.5
27	.65	.58	.44	.85	2.05	1.65	.65	.55	.6	.55	.5	.5
28	.65	.56	.45	.85	2.0	1.6	.65	.55	.6	.55	.5	.5
29	.65	.54	.45	.90	2.0	1.55	.65	.55	.6	.55	.5	.5
30	.65	......	.45	.95	2.0	1.55	.65	.55	.6	.55	.5	.5
31	.65	......	.45	......	2.0	......	.65	.55	......	.55	......	.5

Daily discharge, in second-feet, of Vermilion River below Lake Vermilion, near Tower, Minn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	130	122	106	93	208	540	340	122	107	114	100	100
2	130	122	103	93	231	540	321	122	107	114	100	100
3	130	122	103	93	257	540	321	122	107	114	100	100
4	130	122	103	93	287	515	304	114	107	114	100	100
5	130	122	103	93	321	515	287	114	114	114	100	100
6	130	122	103	93	358	515	287	114	114	114	100	100
7	130	122	103	93	398	490	287	114	114	114	100	100
8	130	122	100	97	420	490	272	114	114	114	100	100
9	130	122	100	100	442	490	272	107	114	114	100	100
10	130	122	100	100	490	490	257	107	114	114	100	100
11	130	120	100	100	490	515	244	107	114	114	100	100
12	130	119	100	103	540	515	244	107	114	114	100	100
13	130	119	100	106	540	490	244	107	114	114	100	100
14	130	117	94	107	568	466	257	100	114	114	100	100
15	130	117	92	107	568	466	244	100	114	114	100	100

Daily discharge, in second-feet, of Vermilion River below Lake Vermilion, near Tower, Minn., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	130	116	89	107	568	442	244	100	114	114	100	100
17	130	116	89	110	568	442	244	100	114	114	100	100
18	127	114	89	114	568	442	148	100	114	114	100	100
19	127	114	89	119	595	442	148	100	114	114	100	100
20	127	114	89	122	595	420	130	100	114	107	100	100
21	127	114	89	127	595	420	130	100	114	107	100	100
22	122	114	89	130	595	420	130	100	114	107	100	100
23	122	114	89	130	568	420	130	100	114	107	100	100
24	122	114	89	130	568	398	130	100	114	107	100	100
25	122	114	89	139	568	398	122	100	114	107	100	100
26	122	114	90	148	568	378	122	107	114	107	100	100
27	122	111	92	158	568	378	122	107	114	107	100	100
28	122	108	93	158	540	358	122	107	114	107	100	100
29	122	106	93	167	540	340	122	107	114	107	100	100
30	122	......	93	177	540	340	122	107	114	107	100	100
31	122	......	93	......	540	......	122	107	......	107	......	100

NOTE.—Daily discharge computed from a well-defined rating curve.

Monthly discharge of Vermilion River below Lake Vermilion, near Tower, Minn., for 1912.

[Drainage area, 507 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	130	122	127	0.250	0.29	A.
February	122	106	117	.231	.25	A.
March	106	89	95.3	.188	.22	A.
April	177	93	117	.231	.26	A.
May	595	208	490	.966	1.11	A.
June	540	340	454	.895	1.00	A.
July	340	122	209	.412	.48	B.
August	122	100	107	.211	.24	B.
September	114	107	113	.223	.25	B.
October	114	107	111	.219	.25	B.
November	100	100	100	.197	.22	B.
December	100	100	100	.197	.23	B.
The year	595	89	178	.351	4.80	

LITTLE FORK RIVER AT LITTLE FORK, MINN.

Location.—At the lower of the two highway bridges in Little Fork in sec. 9, T. 68 N., R. 25 W., 1½ miles above the mouth of Beaver Brook.

Records available.—June 23, 1909, to December 31, 1912.

Drainage area.—1,720 square miles.

Gage.—Vertical staff—datum unchanged since establishment.

Channel.—Practically permanent, except for temporary backwater from log jams at the railroad bridge below the station.

Discharge measurements.—Made from the bridge.

Artificial control.—The river is used throughout the spring and summer for log driving. There are, however, no logging dams on the river, so that the flow is natural.

Winter flow.—The river is completely frozen over at the station from November to April.

Accuracy.—Conditions at the station are favorable and the records of flow should be reliable.

Discharge measurements of Little Fork River at Little Fork, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 21[a]	S. B. Soulé	5.52	64
Feb. 26[b]	do	5.76	73
Mar. 30[c]	do	5.94	67
May 20[d]	do	12.34	2,290
20[d]	do	12.23	2,230
June 14	S. B. Soulé	6.83	610
14	do	6.83	605
Aug. 6[e]	W. G. Hoyt	5.28	131
Dec. 19[f]	S. B. Soulé	5.82	113

[a] Complete ice cover; average thickness of ice, 1.19 feet; average distance water surface to top of ice, 0.28 foot.

[b] Complete ice cover; average thickness of ice, 1.60 feet; average distance water surface to top of ice, 0.07 foot.

[c] Complete ice cover; average thickness of ice, 1.78 feet; average distance water surface to top of ice, 0.00 foot.

[d] Log jam on railway bridge about 2 miles below gage.

[e] Backwater from logs held in boom just below railway bridge.

[f] Complete ice cover; average thickness of ice, 0.68 foot.

Daily gage height, in feet, of Little Fork River at Little Fork, Minn., for 1912.

[Herman I. Mous, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		5.45		5.95	11.0		6.2	5.45	5.8	8.0	6.0	
2					11.1		7.3	5.35	5.85	7.9	6.0	
3			5.75		10.4	8.0	7.2	5.4	5.8	7.6	6.0	
4				6.1	10.6	7.4	6.6	5.3	5.75	7.4	6.0	
5	5.95	5.45			11.6	7.4	6.3	5.2	8.8	7.2	6.0	6.0
6					11.7	7.4	6.0	5.3	8.2	7.1	6.0	
7				11.7	12.4	7.5	6.0	5.3	8.7	7.1	6.0	
8	5.8	5.45	5.75	12.0	12.7	7.3	6.1	5.3	8.6	6.8	6.0	
9				12.4	12.5	7.4	6.0	5.3	8.7	6.6	6.0	
10				12.0	12.6	7.2	6.0	5.3	8.6	6.8	6.0	
11	5.8		5.70	11.8	12.5	6.2	5.8	5.3	8.4	6.8	6.0	
12		5.45		10.9	12.6	6.5	5.8	5.3	7.6	6.7	5.95	5.75
13				10.5	12.9	6.7	6.0	5.3	7.8	6.8	5.95	
14			5.80	10.0	12.8	6.8	6.3	5.2	7.5	6.6	5.9	
15	5.8	5.45		9.8	13.6	6.7	6.2	5.2	7.2	6.7	5.9	
16				9.3	14.1	6.6	5.9	5.1	7.0	6.7	5.9	
17				8.9	13.6	6.5	5.8	5.2	6.8	6.6	6.2	
18	5.7		5.8	9.0	13.1	6.5	5.8	5.25	6.6	6.5	6.4	
19		5.8		8.8	12.5	6.6	5.7	5.3	6.2	6.4	6.4	5.7
20				8.7	12.5	6.7	5.6	5.3	5.9	6.4	6.4	
21	5.5		5.8	8.5	12.0	6.9	5.65	5.3	5.9	6.2	6.3	
22	5.5			8.4	11.4	6.8	5.6	5.3	6.0	6.3	6.2	
23		5.8		8.1	11.1	6.6	5.7	5.3	6.3	6.3	6.1	
24				7.4	10.6	6.5	5.8	5.3	6.6	6.2	6.1	
25			5.85	7.2	9.9	6.3	5.6	5.3	6.9	6.1	6.2	
26	5.5	5.8		7.7	8.9	6.2	5.6	5.3	7.2	6.1	6.3	5.9
27				9.2	8.5	6.0	5.65	5.3	7.3	5.95	6.3	
28				9.9	8.4	5.8	5.6	5.4	7.7	5.8	6.3	
29	5.5	5.8	5.9	10.5	8.1	5.7	5.6	5.7	7.9	6.1	6.3	
30			5.9	10.8	7.4	5.7	5.6	5.9	7.0	6.1	6.2	
31							5.6	5.9		6.0		

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 12, and about Nov. 17 to Dec. 31; by log jams Apr. 29 to May 2 and May 15 to 25, and by floating logs held in boom below station about July 13 to Aug. 31.

Daily discharge, in second-feet, of Little Fork River at Little Fork, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	2,000	910	395	160	289	1,030	341
2	....	2,040	970	756	140	302	989	341
3	....	2,080	1,030	719	150	289	870	341
4	....	2,180	793	513	130	276	793	341
5	....	2,660	793	423	112	1,360	719	341
6	....	2,710	793	341	130	1,110	683	341
7	....	3,060	831	341	130	1,320	683	341
8	....	3,210	756	368	130	1,280	578	341
9	....	3,110	793	341	130	1,320	513	341
10	....	3,160	719	341	130	1,280	578	341
11	....	3,110	395	289	130	1,190	578	341
12	....	3,160	482	289	130	870	545	328
13	2,130	3,310	545	289	130	949	578	328
14	1,900	3,260	578	368	112	831	513	315
15	1,820	2,910	545	341	112	719	545	315
16	1,590	3,160	513	264	97	647	545	315
17	1,410	2,910	482	240	112	578	513	....
18	1,460	2,660	482	240	121	513	482	....
19	1,360	2,360	513	216	130	395	452	....
20	1,320	2,360	545	193	130	315	452	....
21	1,230	2,130	612	204	130	315	395	....
22	1,190	1,860	578	193	130	341	423	....
23	1,070	1,720	513	193	130	423	423	....
24	793	1,500	482	193	130	513	395	....
25	719	1,190	423	193	130	612	368	....
26	909	1,410	395	193	130	719	368	....
27	1,540	1,230	341	204	130	756	328	....
28	1,860	1,190	289	193	150	909	289	....
29	1,900	1,070	264	193	216	989	368	....
30	1,950	793	264	193	264	647	368	....
31	....	850	....	193	264	....	341	....

NOTE.—Daily discharge computed from a discharge rating table that is well defined for unobstructed channel conditions. Daily discharge interpolated Apr. 29 to May 2 and July 23 and 24 and daily gage heights as published reduced 1.5 feet to enter discharge rating table May 15 to 25 because of log jams. Gage heights reduced 0.2 foot to enter discharge rating table July 13 to Aug. 31 because of effect of floating logs. Discharge interpolated May 31 to June 2. Discharge Jan. 1 to Apr. 12 and Nov. 17 to Dec. 31 estimated, because of ice, from climatologic records, discharge measurements and observer's reports, as follows: Jan. 1–31, 85 second-feet, varying from about 130 to 60 second-feet; Feb. 1–29, 75 second-feet, varying from about 80 to 70 second-feet; Mar. 1–31, 70 second-feet; Apr. 1–12, 650 second-feet, varying from about 70 to 2,000 second-feet; Nov. 17–30, 300 second-feet, varying from about 315 to 285 second-feet; Dec. 1–31, 150 second-feet, varying from about 250 to 100 second-feet.

Monthly discharge of Little Fork River at Little Fork, Minn., for 1912.

[Drainage area, 1,720 square miles.[a]]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	85	0.049	0.06	C.
February	....	....	75	.044	.05	C.
March	....	....	70	.041	.05	B.
April	....	....	1,130	.657	.73	C.
May	3,310	793	2,270	1.32	1.52	B.
June	1,030	264	588	.342	.38	B.
July	756	193	304	.177	.20	C.
August	264	97	140	.081	.09	C.
September	1,360	276	735	.427	.48	C.
October	1,030	289	539	.313	.36	B.
November	....	....	318	.185	.21	C.
December	....	....	150	.087	.10	C.
The year	3,310	....	535	.311	4.23	

[a] Although there is considerable swamp land in this drainage area it is still in its natural state, and it is believed, therefore, that the estimates "Discharge in second-feet per square mile" and "Run-off (depth in inches)" are not misleading.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

BIG FORK RIVER AT BIG FALLS, MINN.

Location.—At Big Falls, about 500 feet below the lower end of the rapids.

Records available.—August 27, 1909, to September 30, 1912.

Drainage area.—1,320 square miles.

Gage.—Vertical staff. The gage was originally located at the Minnesota and International bridge above the falls, but jams at that point caused so much trouble that on June 10, 1911, the station was moved to its present site, the new gage being set to read approximately 1 foot lower than the old gage. Gage heights for 1911 have been referred to the present gage and gage heights for 1912 were taken at this gage.

Channel.—Although the channel is practically permanent in itself, it is for the greater part of the year full of logs.

Discharge measurements.—Made from a car and cable one-fourth mile below the gage.

Winter flow.—Daily discharge January 1 to March 31 estimated, because of ice, from discharge measurements, gage heights, climatologic records, and discharge of adjacent drainage areas, as follows: January 1–31, 30 second-feet, varying from about 40 to 25 second-feet; February 1–29, 30 second-feet, varying from about 25 to 40 second-feet; March 1–31, 35 second-feet, varying from about 40 to 30 second-feet.

Accuracy.—The formation of log jams throughout the river's course makes it impossible to so place a gage that the relation between gage heights and discharge will be constant for any extended period. Owing to the inability to secure weekly measurements, no estimates of flow can be given except during the period of ice when the effect of log jams is relatively unimportant, and the mean monthly discharge can be estimated from the current meter measurements. The discharge for the entire year can be approximately estimated by determining the relation between the discharge of Little Fork and Big Fork rivers at the times of discharge measurements, assuming such relation to hold at other times and then using it in conjunction with the gage heights at Big Falls to estimate the flow of the Big Fork.

Discharge measurements of Big Fork River at Big Falls, Minn., in 1912.

[Hydrographer, S. B. Soulé.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 23 [a]	2.33	26.9	May 21	5.06	951
Feb. 27 [b]	2.39	37.2	Aug. 8 [e]	3.13	97
Apr. 1 [c]	2.24	27.0	Dec. 20 [f]	2.40	46
Apr. 1 [d]	2.24	28.6			

[a] Complete ice cover; average thickness of ice, 1.24 feet; average distance water surface to top of ice, 0.29 foot.

[b] Complete ice cover; average thickness of ice, 1.27 feet; average distance water surface to top of ice, 0.32 foot.

[c] Section about 40 feet below downstream edge of highway bridge; measurement in open water; complete ice cover at gage.

[d] Section about 25 feet below downstream edge of highway bridge; measurement in open water; complete ice cover at gage.

[e] A great many logs in channel, causing considerable backwater.

[f] Complete ice cover at gage; open at measuring section at foot of rapids.

Daily gage height, in feet, of Big Fork River at Big Falls, Minn., for 1912.

[Ferne Butler, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.75	2.2	....	2.25	5.2	4.8	4.7	3.4	4.6
2	....	....	....	....	5.2	4.7	4.6	3.3	4.4
3	....	....	....	....	5.0	4.6	4.6	3.3	4.2
4	2.7	....	2.5	....	5.2	4.4	4.5	3.1	3.4
5	....	2.2	....	2.25	5.4	4.4	4.4	3.2	3.1
6	....	....	....	....	5.4	4.4	4.0	3.3	3.1
7	....	....	2.35	....	5.4	4.6	3.8	3.3	3.2
8	2.65	2.3	....	4.4	5.4	4.4	4.2	3.2	3.1
9	....	....	....	4.6	5.6	4.4	4.4	3.2	3.1
10	....	....	....	4.7	5.8	4.5	4.1	3.1	3.0
11	2.65	....	2.4	5.1	6.2	4.4	4.0	3.2	2.9
12	....	2.25	....	5.0	6.0	4.4	4.0	3.3	2.9
13	....	....	....	5.0	5.8	4.6	3.8	3.3	2.9
14	....	....	2.3	4.8	5.7	4.8	4.4	3.2	2.9
15	2.55	2.3	....	4.6	6.0	4.9	4.2	3.2	2.85
16	....	....	....	4.4	6.2	5.0	4.0	3.2	2.9
17	....	....	....	4.2	6.0	5.0	4.0	3.2	2.9
18	....	....	2.3	4.2	6.1	4.8	3.9	3.3	2.9
19	....	2.25	....	4.0	5.9	4.8	4.0	3.3	2.9
20	....	....	....	3.9	5.2	4.7	4.0	3.4	2.8
21	....	....	2.3	4.0	5.0	4.6	4.2	3.5	2.75
22	2.3	2.3	....	3.9	4.9	4.5	3.9	3.8	2.8
23	2.3	....	....	3.8	4.9	4.6	3.7	4.2	3.0
24	....	....	....	3.8	4.8	4.6	3.7	4.8	3.2
25	2.3	....	2.3	4.0	4.8	4.4	3.6	4.6	3.3
26	....	2.35	....	4.3	4.8	4.6	3.5	4.2	3.6
27	....	2.4	....	4.5	4.8	4.8	3.5	4.3	4.2
28	....	....	2.2	4.6	4.8	5.1	3.6	4.7	4.6
29	2.25	2.4	....	4.8	4.7	4.8	3.4	4.1	4.7
30	....	....	....	5.2	4.7	5.2	3.4	4.2	4.8
31	....	....	....	....	4.7	....	3.4	4.6	....

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to Apr. 7.

UPPER MISSISSIPPI RIVER DRAINAGE BASIN.

MISSISSIPPI RIVER ABOVE SANDY RIVER, NEAR LIBBY, MINN.

Location.—A short distance above the mouth of Sandy River in sec. 25, T. 50 N., R. 24 W., near Libby post office, in Aitkin County.

Records available.—September 1, 1895, to December 31, 1912.

Drainage area.—4,510 square miles.

Gage.—Vertical staff.

Discharge measurements.—Made by an employee of the United States Corps of Engineers, stationed at Sandy Lake dam.

Artificial control.—Flow at this station is controlled in the interest of navigation by three reservoirs, namely, Lake Winnibigoshish, Leech Lake, and Pokegama Falls.

Cooperation.—Station maintained by United States Corps of Engineers for the purpose of determining the flow of the river above Sandy Lake reservoir.

Daily discharge, in second-feet, of Mississippi River above Sandy River, near Libby, Minn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	684	396	542	671	1,060	1,520	1,540	1,350	1,310	2,440	1,460	918
2	659	411	538	687	1,120	1,540	1,570	1,360	1,380	2,340	1,420	885
3	634	426	534	703	1,190	1,570	1,600	1,370	1,460	2,240	1,380	853
4	609	441	530	718	1,250	1,590	1,630	1,380	1,530	2,140	1,340	820
5	583	456	527	734	1,320	1,610	1,660	1,400	1,600	2,040	1,300	787
6	557	471	524	750	1,380	1,640	1,700	1,410	1,670	[a]1,940	1,260	755
7	[a]532	486	521	765	1,450	1,660	1,730	1,420	1,740	1,930	1,220	722
8	528	501	518	781	1,510	[a]1,680	[a]1,760	[a]1,430	1,810	1,930	1,180	690
9	523	517	515	796	1,580	1,690	1,740	1,440	1,880	1,930	1,150	657
10	519	533	[a]512	812	1,640	1,700	1,720	1,450	1,960	1,930	1,110	624
11	514	[a]548	516	827	1,700	1,710	1,710	1,460	2,030	1,920	1,070	592
12	510	544	519	843	[a]1,770	1,720	1,690	1,470	2,100	1,920	1,030	559
13	505	540	523	[a]859	1,760	1,730	1,680	1,480	2,170	1,920	[a]990	[a]523
14	500	537	527	867	1,740	1,740	1,660	1,490	2,240	1,920	988	522
15	496	534	530	875	1,730	1,750	1,650	1,500	[a]2,310	1,920	986	521
16	491	531	[a]534	883	1,710	1,760	[a]1,630	1,510	2,300	[a]1,910	983	521
17	487	528	543	891	1,700	1,760	1,620	[a]1,520	2,280	1,850	981	520
18	482	525	552	899	[a]1,680	[a]1,770	1,610	1,510	2,270	1,780	979	519
19	478	521	561	907	1,670	1,760	1,600	1,490	2,250	1,720	976	518
20	473	518	570	915	1,640	1,750	1,590	1,470	2,240	1,650	974	517
21	[a]468	[a]515	580	923	1,620	1,730	1,580	1,460	2 220	1,590	972	[a]516
22	460	518	589	931	1,590	1,720	[a]1,570	1,440	[a]2,210	[a]1,520	970	520
23	451	522	[a]598	940	1,570	[a]1,710	1,540	1,430	2,250	1,520	967	525
24	443	526	605	948	1,540	1,680	1,520	1,410	2,290	1,520	965	530
25	434	530	612	956	[a]1,510	1,650	1,490	[a]1,400	2,330	1,510	963	534
26	426	534	620	964	1,500	1,620	1,470	1,370	2,380	1,510	960	538
27	417	537	627	[a]972	1,500	1,600	1,440	1,340	2,420	1,510	958	548
28	409	541	635	980	1,500	1,570	1,420	1,320	2,460	1,500	955	543
29	400	[a]545	642	988	1,500	1,540	1,390	1,290	2,500	1,500	953	552
30	390	......	649	[a]995	1,500	[a]1,510	1,360	1,270	[a]2,540	1,500	950	557
31	[a]381	......	[a]656	......	[a]1,500	......	[a]1,340	[a]1,240	......	[a]1,500	......	[a]563

[a] Discharge measurement.

Monthly discharge of Mississippi River above Sandy River, near Libby, Minn., for 1912.

[Drainage area, 4,510 square miles.] [a]

Month.	Discharge in second-feet.			Run-off (total in millions of cubic feet).
	Maximum.	Minimum.	Mean.	
January	684	381	498	1,330
February	548	396	508	1,270
March	656	512	563	1,510
April	995	671	859	2,230
May	1,770	1,060	1,530	4,100
June	1,770	1,510	1,670	4,330
July	1,760	1,340	1,590	4,260
August	1,520	1,240	1,420	3,800
September	2,540	1,310	2,070	5,370
October	2,440	1,500	1,810	4,850
November	1,460	950	1,080	2,800
December	918	516	611	1,640
The year	2,540	381	1,180	37,500

[a] Discharge in "Second-feet per square mile" and "Run-off (depth in inches)" not published for this drainage area because the flow at the station is modified by the operation of six reservoirs in the interest of navigation, as noted under "Artificial control" in station description.

NOTE.—Computed by engineers of the United States Geological Survey from daily discharge record furnished by the Corps of Engineers, U. S. Army.

MISSISSIPPI RIVER AT ANOKA, MINN.

Location.—At highway bridge connecting Anoka with Champlain, Minn., a short distance above the mouth of Rum River.

Records available.—November 3, 1896, to September 10, 1897 (United States Engineer Corps records); May 8, 1905, to December 31, 1912.

Drainage area.—17,100 square miles.

Gage.—Chain gage; staff gage prior to 1909; datum, unchanged since establishment of station, is the same as that used by the United States Engineer Corps in 1896 and 1897.

Channel.—Practically permanent. Control temporarily changed for a few days at a time by log jams.

Discharge measurements.—Made from bridge.

Winter flow.—The river is frozen and regular observations are discontinued from December to March. The monthly discharge for this period during 1912 is based on the records of flow kept by the United States Enigneer Corps records at Lock and Dam No. 2, below Minneapolis, an allowance being made for the increase in flow between the two points.

Artificial control.—The nearest dam is located at Minneapolis, but on account of the fall between the two points, its influence does not extend to the Anoka station. The first dam above Anoka is at St. Cloud. The flow of the river is controlled by Government dams on the upper river at Lake Winnibigoshish, Leech Lake, Pokegama Falls, Sandy Lake, Pine River, and Gull Lake, for the purpose of increasing the low-water open-season flow in the interest of navigation. Although the river is used extensively for log driving there is very little backwater from log jams forming below the station, except for a few days at a time.

Accuracy.—Although no measurements were made during 1907 and 1908, those made subsequently indicate that there has been no great change in the discharge rating curve as developed in 1897, 1905, and 1906, and therefore, it can be applied to all gage heights since the establishment of the station. This permanence of conditions indicates that the records of flow are reliable.

The following discharge measurement was made by Hoyt and Soulé:

June 5, 1912; gage height, 1.40 feet; discharge, 8,480 second-feet.

Daily gage height, in feet, of Mississippi River at Anoka, Minn., for 1912.

[B. J. Witte, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	0.9	0.8	2.4	0.0	0.5	0.3	0.1	—0.2
2	1.0	.8	2.2	.0	.4	.3	.1	— .2
3	1.2	1.0	1.9	.0	.6	.3	.2	— .2
4	1.4	1.6	1.8	.1	.6	.2	.2	— .2
5	1.5	2.8	1.6	.0	.6	.2	.2	— .2
6	1.8	5.0	1.4	.3	.6	.2	.2	— .3
7	1.7	6.2	1.2	.3	.2	.1	.2	— .3
8	1.5	6.4	1.0	.2	—.1	.1	.1	— .2
9	1.2	6.2	.9	.8	.1	.0	.1	— .3
10	1.0	5.8	.8	.4	.2	— .1	.2	— .4
11	1.0	5.4	.8	.4	.1	— .2	.2	— .4
12	.8	4.8	.4	.5	.1	— .1	.3	— .3
13	.7	4.3	.5	.5	.2	— .1	.2	— .4
14	.6	3.9	.4	.4	.2	— .2	.1	— .5
15	.6	3.2	.5	.3	.3	— .2	.1	— .4
16	.5	3.1	.4	.3	.3	— .1	.0	— .4
17	.7	2.5	.4	.2	.2	.0	.1	— .4
18	.8	2.3	.3	.3	.3	.1	.1	— .5
19	.6	2.1	.5	.4	.3	.1	.1	— .4
20	.5	2.0	.5	.4	.2	.2	.2	— .4
21	....	1.9	.5	.4	.2	.1	.2	— .4
22	.4	2.0	....	.4	.2	.1	.3	— .4
23	.4	1.9	.5	.8	.2	.1	.2	— .4
24	.2	2.2	.5	.5	.2	.1	.3	— .5
25	.3	2.0	.4	1.0	.2	.1	.1	— .6
26	.4	2.1	.1	.9	.1	.2	.0	— .8
27	.4	2.2	.0	.9	....	.1	— .1	— .7
28	.5	2.4	.1	.8	....	.2	— .2	— .8
29	.6	2.4	.0	.7	.2	.2	— .2	— .8
30	.6	2.6	.0	.6	.4	.1	— .3	— .6
31	....	2.6	....	.6	.4	....	— .2	....

Daily discharge, in second-feet, of Mississippi River at Anoka, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	6,440	6,110	12,400	4,080	5,240	4,740	4,290	3,690
2	6,780	6,110	11,600	4,080	4,980	4,740	4,290	3,690
3	7,520	6,780	10,300	4,080	5,510	4,740	4,510	3,690
4	8,300	9,100	9,910	4,290	5,510	4,510	4,510	3,690
5	8,700	14,200	9,100	4,080	5,510	4,510	4,510	3,690
6	9,910	24,600	8,300	4,740	5,510	4,510	4,510	3,510
7	9,500	30,700	7,520	4,740	4,510	4,290	4,510	3,510
8	8,700	31,800	6,780	4,510	3,880	4,290	4,290	3,690
9	7,520	30,700	6,440	6,110	4,290	4,080	4,290	3,510
10	6,780	28,700	6,110	4,980	4,510	3,880	4,510	3,340
11	6,780	26,600	6,110	4,980	4,290	3,690	4,510	3,340
12	6,110	23,600	4,980	5,240	4,290	3,880	4,740	3,510
13	5,800	21,200	5,240	5,240	4,510	3,880	4,510	3,340
14	5,510	19,300	4,980	4,980	4,510	3,690	4,290	3,150
15	5,510	16,000	5,240	4,740	4,740	3,690	4,290	3,340
16	5,240	15,500	4,980	4,740	4,740	3,880	4,080	3,340
17	5,800	12,800	4,980	4,510	4,510	4,080	4,290	3,340
18	6,110	12,000	4,740	4,740	4,740	4,290	4,290	3,150
19	5,510	11,200	5,240	4,980	4,740	4,290	4,290	3,340
20	5,240	10,700	5,240	4,980	4,510	4,510	4,510	3,340
21	5,110	10,300	5,240	4,980	4,510	4,290	4,510	3,340
22	4,980	10,700	5,240	4,980	4,510	4,290	4,740	3,340
23	4,980	10,300	5,240	6,110	4,510	4,290	4,510	3,340
24	4,510	11,600	5,240	5,240	4,510	4,290	4,740	3,150
25	4,740	10,700	4,980	6,780	4,510	4,290	4,290	3,030
26	4,980	11,200	4,290	6,440	4,290	4,510	4,080	2,760
27	4,980	11,600	4,080	6,440	4,360	4,290	3,880	2,900
28	5,240	12,400	4,290	6,110	4,430	4,510	3,690	2,760
29	5,510	12,400	4,080	5,800	4,510	4,510	3,690	2,760
30	5,510	13,300	4,080	5,510	4,980	4,290	3,510	3,030
31	....	13,300	....	5,510	4,980	....	3,690	....

NOTE.—Daily discharge computed from a rating curve well defined between 3,180 and 29,700 second-feet (gage heights —0.5 and 6 feet). Discharge Jan. 1 to Mar. 31 and Dec. 1-31 estimated, because of ice, from the flow of the Mississippi at Dam No. 2 as determined by the United States Engineer Corps, minus the flow of Rum River at Cambridge, and the estimated inflow from the remaining drainage area between Anoka and dam No. 2, as follows: Jan 1-31, 2,340 second-feet; Feb. 1-29, 2,330 second-feet; Mar. 1-31, 2,640 second-feet; Dec. 1-31, 2,640 second-feet.

Monthly discharge of Mississippi River at Anoka, Minn., for 1912.

[Drainage area, 17,100 square miles. [a]]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	....	....	2,340	D.
February	....	....	2,330	D.
March	....	....	2,640	D.
April	9,910	4,510	6,280	B.
May	31,800	6,110	15,700	A.
June	12,400	4,080	6,230	A.
July	6,780	4,080	5,120	A.
August	5,510	3,880	4,680	B.
September	4,740	3,690	4,260	B.
October	4,740	3,510	4,300	B.
November	3,690	2,760	3,320	C.
December	....	....	2,640	D.
The year	31,800	....	5,000	

[a] "Discharge in second-feet per square mile" and "Run-off (depth in inches)" not computed for this drainage area, because the flow past the station is controlled, in the interest of navigation, by reservoirs as noted under "Artificial control" in station description.

NOTE.—See footnote to table of daily discharge.

MISSISSIPPI RIVER AT ST. PAUL, MINN.

Location.—Near foot of Wabasha Street, St. Paul, 6 miles below the mouth of Minnesota River.

Records available.—Gage heights by United States Signal Service (later United States Weather Bureau), 1873 to 1912. Many discharge measurements by United States Engineer Corps prior to 1900. Measurements made by United States Geological Survey, 1909 to 1912. Daily discharge March 1, 1892, to December 31, 1912.

Drainage area.—35,700 square miles.

Gage.—Vertical staff; datum unchanged. In 1911 the gage was moved upstream several hundred yards, but it was set to read the same as at the original location. Gage read once a day. Near the same site is the gage of the United States Engineer Corps, the datum of which is 0.5 foot higher. All data herein refer to the Weather Bureau gage.

Channel.—Somewhat shifting from year to year.

Discharge measurements.—Made from the Omaha Railway bridge 2 miles above the station.

Winter flow.—From December to March the river is frozen and the open-channel rating curve is not applicable. Monthly estimates of flow for this period are based on the records of the St. Anthony Falls Water Power Co. at Minneapolis, and the records of the United States Engineer Corps at lock and dam No. 2 below Minneapolis, an allowance being made for the flow of the Minnesota River.

Artificial control.—The river is controlled to a certain extent by the Government reservoirs on the headwaters at Lake Winnibigoshish, Leech Lake, Pokegama Falls, Sandy Lake, Pine River, and Gull Lake, but the effect of these reservoirs is felt very gradually at St. Paul. The nearest dam is at Minneapolis, and it is possible that the shutting of the wheel gates at that point may cause some daily fluctuations of stage at St. Paul during extreme low water.

Maximum and minimum flow.—The highest recorded discharge occurred July 22, 1867, and amounted to 117,000 second-feet. Since 1892 the highest discharge has been 80,800 second feet. The winter flow has fallen nearly as low as 1,000 second-feet.

Accuracy.—As the Weather Bureau gage is read once a day, the recorded mean gage height for the day may be somewhat in error, although occasional additional readings have shown this error was not serious, largely because of the natural storage of the river channel between the Minneapolis dam and St. Paul. Previous to 1900 the United States Engineer Corps made many discharge measurements at St. Paul, the results of which are published by the Mississippi River Commission. Although the base data for estimating the daily flow of the river are available for years prior to 1892, the reservoir system was not then in complete operation, and as this system has had a marked influence on the regimen of the river, it is evident that the earlier records have lost much of their value as indications of probable future flow.

Cooperation.—Gage heights furnished by United States Weather Bureau; data on which estimates of mean monthly flow from December to March have been based furnished by the United States Engineer Corps.

Discharge measurements of Mississippi River at St. Paul, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 3	Soulé and Orbeck	6.28	16,200	July 30	Hoyt and Soulé	2.09	6,610
July 11	Soulé and Peterson	2.32	6,820	Sept. 13	do	1.21	4,920

Daily gage height, in feet, of Mississippi River at St. Paul, Minn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			1.1	4.5	4.2	5.8	1.3	1.5	2.1	1.4	0.8	−0.3
2	1.2			5.0	4.2	5.7	1.6	1.5	2.0	1.4	.8	.2
3		0.3		5.9	4.2	5.4	1.5	1.4	2.0	1.4	.9	.0
4				6.5	4.6	5.1	1.5	1.2	2.0	1.3	.9	.0
5				6.4	5.3	4.6	1.8	1.0	1.9	1.4	.7	.2
6		.6	.8	6.3	7.1	4.3	1.7	1.1	1.9	1.4	.6	.0
7	.7			6.2	9.1	4.2	2.0	1.1	1.6	1.3	.7	−1.0
8				5.9	10.4	4.0	1.8	1.0	1.6	1.3	.6	− .5
9				5.7	11.0	3.8	2.0	1.1	1.7	1.3	.5	1.1
10		.3		5.2	11.2	3.6	2.3	1.2	1.3	1.3	.5	.5
11				4.8	10.9	3.4	2.0	1.4	1.0	1.2	.5	.8
12				4.7	10.6	3.3	2.0	1.3	1.0	1.4	.5	.8
13	.7		.4	4.5	10.1	2.8	2.6	1.3	1.0	1.4	.4	1.1
14				4.4	9.7	2.9	2.3	1.4	1.0	1.4	.4	1.0
15				4.2	9.0	3.0	2.1	1.4	.9	1.3	.4	1.0
16		.5	− .5	4.3	8.3	2.8	2.0	1.4	1.0	1.3	.5	1.5
17				4.2	7.9	2.7	1.8	1.5	.9	1.3	.6	.2
18			− .6	4.1	7.1	2.8	1.5	1.7	.8	1.2	.5	.0
19	.7		− .1	4.0	6.7	2.7	1.6	1.6	.9	1.1	.5	− .2
20				3.9	6.4	2.7	1.6	1.6	.9	1.2	.4	− .2
21		.4		3.8	6.0	2.7	1.4	1.8	1.2	1.2	.4	.1
22				3.9	5.8	2.8	1.2	1.7	1.3	1.2	.4	.7
23	.6		.1	3.9	5.7	2.7	1.2	1.7	1.2	1.0	.5	.9
24			.2	4.0	5.9	2.6	1.8	1.6	1.2	1.0	.5	.7
25			.3	4.0	5.9	2.6	2.1	1.6	1.3	1.1	.4	.5
26			.4	4.0	5.8	2.5	2.3	1.4	1.4	1.2	.3	.4
27		1.1	.6	4.2	5.7	2.2	2.2	1.5	1.3	1.1	.0	.4
28			.9	4.1	6.0	1.8	2.0	1.5	1.3	1.1	− .2	.1
29			1.4	3.9	6.1	1.8	1.7	1.4	1.4	1.2	− .2	− .1
30	.7		2.4	4.0	6.2	1.6	1.8	2.1	1.3	1.0	− .3	.2
31			3.9		6.1		1.8	2.2		.9		.1

NOTE.—Some of the gage heights were read by the observer on a gage which is in error 0.2 foot, notably Apr. 1 to Sept. 30; records for October and November probably correct. Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 31 and about Dec. 1 to 31.

Daily discharge, in second-feet, of Mississippi River at St. Paul, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	10,900	10,000	15,300	5,000	5,340	6,410	5,170	4,290
2	12,400	10,000	15,000	5,510	5,340	6,230	5,170	4,290
3	15,300	10,000	14,000	5,340	5,170	6,230	5,170	4,420
4	17,400	11,200	13,100	5,340	4,840	6,230	5,000	4,420
5	17,000	13,300	11,700	5,870	4,550	6,050	5,170	4,160
6	16,700	19,700	11,000	5,690	4,690	6,050	5,170	4,040
7	16,300	28,500	10,800	6,230	4,690	5,510	5,000	4,160
8	15,300	34,800	10,300	5,870	4,550	5,510	5,000	4,040
9	14,600	37,900	9,840	6,230	4,690	5,690	5,000	3,920
10	13,000	39,000	9,400	6,780	4,840	5,000	5,000	3,920
11	11,800	37,400	8,980	6,230	5,170	4,550	4,840	3,920
12	11,500	35,800	8,770	6,230	5,000	4,550	5,170	3,920
13	10,900	33,300	7,750	7,350	5,000	4,550	5,170	3,800
14	10,600	31,400	7,950	6,780	5,170	4,550	5,170	3,800
15	10,000	28,100	8,150	6,410	5,170	4,420	5,000	3,800

Daily discharge, in second-feet, of Mississippi River at St. Paul, Minn., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16	10,300	24,900	7,750	6,230	5,170	4,550	5,000	3,920
17	10,000	23,200	7,550	5,870	5,340	4,420	5,000	4,040
18	9,780	19,900	7,750	5,340	5,690	4,290	4,840	3,920
19	9,520	18,400	7,550	5,510	5,510	4,420	4,690	3,920
20	9,270	17,400	7,550	5,510	5,510	4,420	4,840	3,800
21	9,030	16,000	7,550	5,170	5,870	4,840	4,840	3,800
22	9,270	15,300	7,750	4,840	5,690	5,000	4,840	3,800
23	9,270	15,000	7,550	4,840	5,690	4,840	4,550	3,920
24	9,520	15,600	7,350	5,870	5,510	4,840	4,550	3,920
25	9,520	15,600	7,350	6,410	5,510	5,000	4,690	3,800
26	9,520	15,300	7,160	6,780	5,170	5,170	4,840	3,680
27	10,000	15,000	6,590	6,590	5,340	5,000	4,690	3,330
28	9,780	16,000	5,870	6,230	5,340	5,000	4,690	3,120
29	9,270	16,300	5,870	5,690	5,170	5,170	4,840	3,120
30	9,520	16,700	5,510	5,870	6,410	5,000	4,550	3,030
31	....	16,300	....	5,870	6,590	....	4,420	....

NOTE.—Daily discharge computed from two well-defined rating curves. Shift occurred during May flood. Some error may have been introduced into the daily discharge by the fact that at times the observer read the wrong gage, which is in error 0.2 foot. This condition is known to have existed Apr. 1 to Sept. 30, but October and November records are believed to be reliable. See footnote to table of daily gage heights for possible source of error in the above daily discharge. Discharge Jan. 1 to Mar. 31, and Dec. 1 to 31 estimated, because of ice, from discharge at lock and dam No. 2, from records of United States Engineer Corps, and flow at Mankato, as follows: Jan. 1-31, 2,800 second-feet; Feb. 1-29, 2,700 second-feet; Mar. 1-31, 3,800 second-feet; Dec. 1-31, 3,170 second-feet.

Monthly discharge of Mississippi River at St. Paul, Minn., for 1912.

[Drainage area, 35,700 square miles.[a]]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	....	....	2,800	D.
February	....	....	2,700	D.
March	....	....	3,800	D.
April	17,400	9,030	11,600	C.
May	39,000	10,000	21,200	C.
June	15,300	5,510	8,960	C.
July	7,350	4,840	5,920	C.
August	6,590	4,550	5,280	C.
September	6,410	4,290	5,120	C.
October	5,170	4,420	4,910	C.
November	4,420	3,030	3,870	C.
December	....	....	3,170	D.
The year	39,000	....	6,620	

[a] "Discharge in second-feet per square mile" and "Run-off (depth in inches)" not computed for this drainage area because the flow past the station is affected by the operation (in the interest of navigation) of reservoirs as noted under "Artificial control" in station description.

NOTE.—See footnotes to table of daily discharge.

SANDY RIVER BELOW SANDY LAKE RESERVOIR, MINN.

Location.—At the Sandy Lake dam, near Libby post office, in Aitkin County, 1 mile above the mouth of Sandy River.

Records available.—July 7, 1893, to December 31, 1912.

Area of reservoir behind dam.—At low stage 8 square miles; at high stage 16.5 square miles; these areas with a range of 9.4 feet give a capacity of 3,127,900,000 cubic feet.

Discharge.—The discharge over the dam is computed from the flow through the openings and from frequent discharge measurements made by an employee who resides near the dam. At extreme flood stages the Mississippi drowns out the dam and fills Sandy Lake reservoir as much as 3 feet higher than was intended. If the Mississippi is at fairly high stage and the dam is open there is frequently a considerable reverse flow into the reservoir, but the amount of this flow has not been computed.

Cooperation.—Station maintained by the United States Engineer Corps for the purpose of measuring the flow from the Sandy Lake reservoir, which is one unit in the Government reservoir system at the headwaters of the Mississippi.

Daily discharge, in second-feet, of Sandy River below Sandy Lake dam, Minn., for 1912.

[0—No flow from reservoir.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10	10	10	10	10	10	502	502	205	0	5	5
2	10	10	10	10	10	10	500	501	212	0	5	5
3	10	10	10	10	10	10	501	498	192	5	5	5
4	10	10	10	10	10	10	503	500	166	5	5	5
5	10	10	10	10	10	10	500	500	170	5	5	5
6	10	10	10	10	10	10	502	500	165	5	5	5
7	10	10	10	10	10	10	500	501	144	5	5	5
8	10	10	10	10	10	10	499	498	120	5	5	5
9	10	10	10	10	10	10	502	502	125	5	5	5
10	10	10	10	10	10	10	500	500	62	5	5	5
11	10	10	10	10	10	10	501	499	0	5	5	5
12	10	10	10	10	10	10	501	501	0	5	5	5
13	10	10	10	10	10	10	499	501	0	5	5	5
14	10	10	10	10	10	10	502	499	0	5	5	5
15	10	10	10	10	10	10	501	502	0	5	5	5
16	10	10	10	10	10	10	498	499	0	5	5	5
17	10	10	10	10	10	10	500	502	0	5	5	5
18	10	10	10	10	10	10	500	500	0	5	5	5
19	10	10	10	10	10	10	499	500	0	5	5	5
20	10	10	10	10	10	10	501	501	0	5	5	5
21	10	10	10	10	10	10	502	450	0	5	5	5
22	10	10	10	10	10	10	498	264	0	5	5	5
23	10	10	10	10	10	10	502	280	0	5	5	5
24	10	10	10	10	319	328	501	326	0	5	5	5
25	10	10	10	10	497	492	500	288	0	5	5	5
26	10	10	10	10	483	505	501	258	0	5	5	5
27	10	10	10	10	480	499	501	270	0	5	5	5
28	10	10	10	10	76	507	499	242	0	5	5	5
29	10	10	10	10	474	503	502	212	0	5	5	5
30	10	......	10	10	475	499	500	245	0	5	5	5
31	10	......	10	......	120	......	501	218	......	5	......	5

Monthly discharge of Sandy River below Sandy Lake dam, Minn., for 1912.

Month.	Discharge in second-feet.			Run-off (total in millions of cubic feet).
	Maximum.	Minimum.	Mean.	
January	10	10	10	26.8
February	10	10	10	25.1
March	10	10	10	26.8
April	10	10	10	25.9
May	497	10	102	273
June	507	10	119	308
July	503	498	501	1,340
August	502	212	421	1,130
September	212	0	52.0	135
October	5	0	4.7	12.6
November	5	5	5	13.0
December	5	5	5	13.4
The year	507	0	105	3,330

NOTE.—Computed by engineers of the United States Geological Survey from record of daily discharge furnished by the United States Engineer Corps. "Discharge in second-feet per square mile" and "Run-off (depth in inches)" not computed for this drainage area because the flow past the station is affected by the operation (in the interest of navigation) of reservoirs.

PINE RIVER BELOW PINE RIVER RESERVOIR, MINN.

Location.—Just below the dam at the outlet of Cross Lake, which is 15 miles above the mouth of Pine River in the central part of Crow Wing County, in T. 137 N., R. 27 W.

Records available.—March, 1886, to December 31, 1912.

Drainage area.—452 square miles.

Area of reservoir surface above dam.—At low water 18 square miles, at high water 24 square miles. These areas, with a range of 16.15 feet, give a capacity of 7,732,900,000 cubic feet. The dam raises the water level in Cross, Pine, Daggett, Rush, Whitefish, Trout, and Hay lakes by varying amounts.

Discharge.—Determined from daily gage heights representing the head at the dam and from the various sized openings in the dam.

Artificial control.—Flow past gaging station is controlled by the operation of Pine River reservoir in the interest of navigation.

Cooperation.—Station maintained by the United States Engineer Corps for the purpose of measuring the flow from Pine River reservoir, the lowest in the present system of Government reservoirs on the headwaters of the Mississippi. Although the discharge of the dam represents the flow from the reservoir, it does not represent the entire flow of Pine River at its mouth because between the two points the drainage area of the river is increased from 452 to 691 square miles by Little Pine River and one or two other minor tributaries.

Daily discharge, in second-feet, of Pine River below Pine River reservoir, Minn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	59	65	70	66	320	[a] 59	507	490	295	145	80	59
2	59	65	[a] 69	66	322	59	508	485	290	144	[a] 77	59
3	60	[a] 65	69	67	324	60	509	[a] 479	285	144	75	58
4	59	65	69	67	[a] 327	60	510	480	275	143	71	58
5	60	66	70	67	325	61	511	485	265	[a] 143	68	58
6	[a] 60	66	70	[a] 67	320	61	[a] 512	488	255	142	65	57
7	60	66	70	67	80	62	510	490	[a] 249	141	60	[a] 57
8	60	67	71	67	75	[a] 63	508	492	249	141	55	57
9	60	67	[a] 71	68	72	62	506	495	249	140	[a] 51	57
10	60	[a] 68	66	68	70	62	504	[a] 502	250	140	51	57
11	60	68	65	68	[a] 68	61	502	496	250	139	51	57
12	60	68	65	69	68	60	500	490	250	[a] 138	51	57
13	[a] 60	68	64	[a] 69	68	59	[a] 498	485	251	135	51	58
14	61	68	64	69	69	59	495	480	[a] 251	130	52	[a] 58
15	61	68	63	70	69	[a] 58	490	478	248	57	52	58
16	61	69	[a] 63	524	69	58	488	475	245	58	[a] 52	59
17	61	[a] 69	63	485	70	59	484	[a] 471	241	59	53	59
18	62	69	64	488	[a] 70	59	480	410	237	60	53	59
19	62	69	64	384	70	60	475	400	235	[a] 59	54	60
20	[a] 62	70	64	175	71	60	[a] 473	380	234	59	55	60
21	63	70	65	317	71	61	468	375	[a] 234	30	55	[a] 61
22	63	70	65	317	71	[a] 61	460	370	205	21	56	61
23	63	71	[a] 65	317	72	63	458	365	195	12	[a] 57	60
24	64	[a] 71	65	317	72	65	456	[a] 362	180	15	57	59
25	64	71	65	318	[a] 72	515	454	355	170	16	57	58
26	64	71	65	318	72	512	450	350	160	17	58	57
27	[a] 65	71	65	[a] 318	73	510	[a] 447	340	156	78	58	56
28	65	72	66	318	73	508	445	330	[a] 154	80	58	[a] 55
29	65	72	66	319	73	[a] 506	442	320	150	[a] 81	59	56
30	66	....	[a] 66	319	74	506	440	310	145	81	[a] 59	56
31	66	....	66	....	74	....	438	300	....	82	....	57

[a] Discharge measurement.

NOTE.—Daily discharge for November differs from that published in the Report of the water-resources investigation of Minnesota, 1911-12, p. 122, which is erroneous, having been estimated from record of gate openings, whereas the figures here given are based on discharge measurements.

Monthly discharge of Pine River below Pine River reservoir, Minn., for 1912.

[Drainage area, 452 square miles.[a]]

Month.	Discharge in second-feet.			Run-off (total in millions of cubic feet).
	Maximum.	Minimum.	Mean.	
January	66	59	61.8	166
February	72	65	68.4	171
March	71	63	66.2	177
April	524	66	208	539
May	327	68	120	321
June	515	58	150	389
July	512	438	482	1,290
August	502	300	427	1,140
September	295	145	228	591
October	145	12	91.3	245
November	80	51	[b] 58.4	151
December	61	55	58.0	155
The year	515	12	169	5,340

[a] "Discharge in second-feet per square mile" and "Run-off (depth in inches)" not computed for this drainage area because flow past the gaging station is controlled in the interest of navigation, as noted in the station description.

[b] See footnote to table of daily discharge.

NOTE.—Computed by engineers of the United States Geological Survey from record of daily discharge furnished by the United States Engineer Corps.

CROW WING RIVER AT NIMROD, MINN.

Location.—At the steel highway bridge at Nimrod post office, in sec. 32, T. 137 N., R. 33 W., about 12 miles east of Sebeka, the nearest railroad point, 1 mile above the mouth of Cat River, and 1 mile below the mouth of Willow Creek.

Records available.—April 15, 1910, to November 30, 1912.

Drainage area.—1,010 square miles.

Gage.—Chain gage, attached to the bridge. On May 19, 1910, the gage datum was lowered 1.20 feet and the readings prior to that date were corrected to agree with the present datum.

Channel.—Probably permanent.

Discharge measurements.—Made from the bridge.

Artificial control.—The river is used for log driving, and a dam at the outlet of Lower Crow Wing Lake controls the water from that portion of the drainage area. There is comparatively little log driving at the present time and it is believed that the flow past the station is practically natural. Since the establishment of the station there has been no trouble from log jams. Crow Wing River has considerable fall near the station and 1 mile above makes a rapid descent of 12 feet, known as Western Rapids.

Winter flow.—The river is frozen over and observations are discontinued from November to March.

The following discharge measurement was made by W. G. Hoyt:

May 8, 1912: Gage height, 5.21 feet; discharge, 608 second-feet.

Daily gage height, in feet, of Crow Wing River at Nimrod, Minn., for 1912.

[W. H. Wintermute, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	4.80	5.0	4.60	4.68	4.96	5.0	4.80
2	6.2	4.85	4.98	4.60	4.70	4.91	5.0	4.80
3	6.2	4.86	4.90	4.60	4.70	4.89	5.0	4.80
4	6.2	5.0	4.94	4.64	4.70	4.88	5.0	4.80
5	6.35	5.1	4.90	4.65	4.70	4.88	5.0	4.80
6	5.15	5.15	4.90	4.61	4.71	4.88	5.0	4.80
7	5.1	5.15	4.90	4.60	4.76	4.88	5.0	4.80
8	5.1	5.2	4.88	4.60	4.82	4.88	5.0	4.80
9	5.1	5.2	4.88	4.60	4.85	4.88	5.0	4.80
10	5.1	5.15	4.85	4.62	4.82	4.88	4.98	4.80
11	5.05	5.1	4.82	4.65	4.80	4.88	4.95	4.80
12	5.0	5.1	4.80	4.70	4.78	4.86	4.93	4.80
13	5.0	5.15	4.80	4.70	4.78	4.91	4.98	4.82
14	4.95	5.05	4.80	4.71	4.78	4.94	4.95	4.85
15	4.94	5.0	4.82	4.74	4.79	4.89	4.95	4.89
16	4.90	5.0	4.85	4.72	4.80	4.88	4.92	4.86
17	4.90	4.98	4.82	4.70	4.84	4.89	4.90	4.82
18	4.89	4.95	4.80	4.68	4.81	4.90	4.88	4.80
19	4.86	4.92	4.80	4.68	4.82	4.90	4.88	4.80
20	4.82	4.92	4.80	4.66	4.82	4.90	4.88	4.78
21	4.78	4.90	4.80	4.65	4.82	4.90	4.88	4.78
22	4.75	4.90	4.80	4.65	4.81	4.92	4.88	4.75
23	4.75	4.92	4.80	4.65	4.80	4.95	4.85	4.75
24	4.75	4.96	4.78	4.65	4.80	4.95	4.85	4.90
25	4.76	5.0	4.76	4.65	4.80	4.98	4.85	5.4
26	4.80	5.0	4.75	4.65	4.80	5.0	4.85	5.05
27	4.84	5.05	4.71	4.65	4.80	5.0	4.82	5.1
28	4.85	5.05	4.66	4.65	4.88	5.0	4.82	5.1
29	4.82	5.0	4.62	4.65	4.94	5.0	4.80	5.2
30	4.80	5.0	4.62	4.65	5.00	5.0	4.80	5.4
31	....	5.0	....	4.65	5.00	....	4.80	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 5, and about Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Crow Wing River at Nimrod, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	324	457	208	253	429	457	324
2	....	356	443	208	264	395	457	324
3	....	362	388	208	264	382	457	324
4	....	457	416	230	264	375	457	324
5	....	530	388	236	264	375	457	324
6	567	567	388	214	270	375	457	324
7	530	567	388	208	300	375	457	324
8	530	604	375	208	337	375	457	324
9	530	604	375	208	356	375	457	324
10	530	567	356	219	337	375	443	324
11	494	530	337	236	324	375	422	324
12	457	530	324	264	312	362	443	324
13	457	567	324	264	312	395	443	337
14	422	494	324	270	312	416	422	356
15	416	457	337	288	318	382	422	382
16	388	457	356	276	324	375	402	362
17	388	443	337	264	350	382	388	337
18	382	422	324	253	330	388	375	324
19	362	402	324	253	337	388	375	324
20	337	402	324	242	337	388	375	312

Daily discharge, in second-feet, of Crow Wing River at Nimrod, Minn., for 1912—Contd.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21	312	388	324	236	337	388	375	312
22	294	388	324	236	330	402	375	294
23	294	402	324	236	324	422	356	294
24	294	429	312	236	324	422	356	....
25	300	457	300	236	324	443	356	....
26	324	457	294	236	324	457	356	....
27	350	494	270	236	324	457	337	....
28	356	494	242	236	375	457	337	....
29	337	457	219	236	416	457	324	....
30	324	457	219	236	457	457	324	....
31	....	457	....	236	457	....	324	....

NOTE.—Daily discharge computed from a rating curve fairly well defined between 160 and 678 second-feet (gage heights 4.5 and 5.3 feet). Slush ice reported running Nov. 1–11, 1911, but no reduction in discharge made to allow for it. Discharge Nov. 24–30, 1912, estimated, because of ice, from climatologic records and discharge of adjacent drainage areas at 294 second-feet.

Monthly discharge of Crow Wing River at Nimrod, Minn., for 1912.

[Drainage area, 1,010 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
April 6–30	567	294	399	0.395	0.37	A.
May	604	324	468	.463	.53	A.
June	457	219	337	.334	.37	A.
July	288	208	237	.235	.27	A.
August	457	253	328	.325	.37	A.
September	457	362	401	.397	.44	A.
October	457	324	401	.397	.46	A.
November	382	....	319	.316	.35	C.

NOTE.—See footnote to table of daily discharge.

CROW WING RIVER AT PILLAGER, MINN.

Location.—At highway bridge one-half mile south of Pillager, in sec. 20, T. 133 N., R. 30 W., a short distance above the mouth of Pillager Creek.

Records available.—May 25 to September 1, 1903, June 11, 1909, to December 31, 1912.

Drainage area.—3,230 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Probably permanent except during high water.

Discharge measurements.—Made from bridge.

Artificial control.—The influence of a logging dam at the outlet of Lower Crow Wing Lake is observable at times at the gaging station. The natural flow has a tendency to be uniform due to the natural lake control in the headwaters.

Winter flow.—The river is frozen over at the gage from December to March and during that period measurements are made through the ice to determine the winter discharge.

Accuracy.—Conditions at this station are favorable for good results, although the shifting of the river bed during high water necessitated the use of more than one rating curve in 1912.

Discharge measurements of Crow Wing River at Pillager, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 24[a]	S. B. Soulé	6.22	326	Aug. 9	W. G. Hoyt	6.15	907
Feb. 28[b]	.....do	6.54	368	30	.....do	6.08	849
May 9	W. G. Hoyt	9.32	4,530	Dec. 18[c]	S. B. Soulé	6.14	440

[a] Under complete ice cover; average thickness of ice, 1.14 feet; average distance water surface to top ice 0.08 foot.

[b] Under complete ice cover; average thickness of ice, 1.34 feet; average distance water surface to top of ice, 0.02 foot.

[c] Complete ice cover; average thickness of ice, 0.74 foot; average distance water surface to top of ice, 0.00 foot.

Daily gage height, in feet, of Crow Wing River at Pillager, Minn., for 1912.

[Eureka Holmgren, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				7.75	6.4	7.2	5.5	5.6	6.2	6.1	5.7	
2			6.5		6.3	7.1	6.5	5.6	6.15	6.1	5.6	
3	6.2	6.4		7.75	6.6	7.0	5.7	5.6	6.1	6.1	5.6	
4					8.4	6.8	5.6	5.55	6.05	6.0	5.65	
5				8.0	10.1	6.7	5.6	5.6	5.95	5.95	5.7	5.8
6	6.2		6.5	7.7	11.0	6.6	5.65	5.7	5.9	5.95	5.7	
7		6.45		7.2	10.0	6.5	5.65	5.8	5.8	5.9	5.7	
8				6.8	9.8	6.3	5.7	5.9	5.8	5.9	5.7	
9			6.5	6.7	9.4	6.2	5.8	6.1	5.8	5.9	5.7	
10	6.15	6.4		6.6	9.1	6.2	6.0	6.25	5.8	5.9	5.7	
11				6.4	9.0	6.1	6.0	6.3	5.75	5.9	5.7	
12				6.3	8.4	6.1	6.0	6.3	5.8	5.9	5.7	5.9
13			6.5	6.3	8.0	6.0	6.0	6.2	5.8	5.9	5.7	
14		6.4		6.3	7.9	6.0	5.9	6.15	5.8	5.85	5.65	
15				6.3	7.8	6.1	5.8	6.1	5.8	5.8	5.6	
16			6.5	6.3	7.6	6.4	5.9	6.05	5.9	5.8	5.75	
17		6.4		6.2	7.1	6.6	5.8	6.05	5.95	5.8	5.7	
18				6.2	7.0	6.6	5.8	6.0	5.9	5.8	5.65	6.15
19				6.15	6.9	6.5	5.7	6.0	5.85	5.8	5.6	6.15
20			6.55	6.1	6.9	6.4	5.7	6.0	5.85	5.75	5.6	
21		6.5		6.05	6.9	6.3	5.7	6.0	5.85	5.75	5.65	
22				6.05	6.8	6.2	5.7	5.9	5.9	5.75	5.65	
23			6.6	5.9	6.8	6.1	5.8	5.85	5.95	5.75	5.6	
24	6.2	6.5		5.9	6.8	5.9	5.8	5.8	5.95	5.75	5.5	
25				5.9	6.8	5.9	5.7	5.7	6.1	5.75	5.55	
26				6.1	6.8	5.8	5.6	5.7	6.1	5.75	6.25	6.2
27	6.25		6.75	6.35	6.9	5.7	5.6	5.7	6.1	5.7		
28		6.55		6.5	7.2	5.7	5.6	5.65	6.1	5.75		
29				6.4	7.2	5.7	5.65	5.7	6.15	5.75		
30			7.9	6.45	7.1	5.6	5.6	6.1	6.1	5.75		
31	6.3				7.1		5.6	6.1		5.75		

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 4, and about Nov. 26 to Dec. 31.

Daily discharge, in second-feet, of Crow Wing River at Pillager, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	1,230	1,920	490	544	940	865	601
2	....	1,150	1,810	1,190	544	902	865	544
3	....	1,390	1,700	601	544	865	865	544
4	....	3,330	1,490	544	517	829	793	572
5	2,840	5,640	1,390	544	544	759	759	601
6	2,480	6,920	1,290	572	601	725	759	601
7	1,940	5,500	1,190	572	661	661	725	601
8	1,560	5,220	1,020	601	725	661	725	601
9	1,470	4,660	940	661	865	661	725	601
10	1,390	4,240	940	793	980	661	725	601
11	1,230	4,110	865	793	1,020	631	725	601
12	1,150	3,330	865	793	1,020	661	725	601
13	1,150	2,840	793	793	940	661	725	601
14	1,150	2,720	793	725	902	661	693	572
15	1,150	2,600	865	661	865	661	661	544
16	1,150	2,360	1,100	725	829	725	661	631
17	1,070	1,810	1,290	661	829	759	661	601
18	1,070	1,700	1,290	661	793	725	661	572
19	1,040	1,590	1,190	601	793	693	661	544
20	1,000	1,590	1,100	601	793	693	631	544
21	966	1,590	1,020	601	793	693	631	572
22	966	1,490	940	601	725	725	631	572
23	863	1,490	865	661	693	759	631	544
24	863	1,490	725	661	661	759	631	490
25	863	1,490	725	601	601	865	631	517
26	1,000	1,490	661	544	601	865	631	....
27	1,190	1,590	601	544	601	865	601	....
28	1,310	1,920	601	544	572	865	631	....
29	1,230	1,920	601	572	601	902	631	....
30	1,270	1,810	544	544	865	865	631	....
31	....	1,810	....	544	865	....	631	....

NOTE.—Daily discharge computed from two rating curves fairly well defined between 600 and 5,500 second-feet. Shift occurred during May flood. Discharge Jan. 1 to Apr. 4 and Nov. 26 to Dec. 31, estimated, because of ice, from discharge measurements, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 1–31, 350 second-feet, varying from about 420 to 320 second-feet; Feb. 1–29, 340 second-feet, varying from about 320 to 370 second-feet; Mar. 1–31, 390 second-feet, varying from about 370 to 1,500 second-feet; Nov. 26–30, 465 second-feet, varying from about 490 to 440 second-feet; Dec. 1–31, 450 second-feet.

Monthly discharge of Crow Wing River at Pillager, Minn., for 1912.

[Drainage area, 3,230 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	350	0.108	0.12	C.
February	....	....	340	.105	.11	C.
March	....	....	390	.121	.14	C.
April	2,840	863	1,350	.418	.47	C.
May	6,920	1,150	2,650	.820	.95	B.
June	1,920	544	1,040	.322	.36	A.
July	1,190	490	645	.200	.23	B.
August	1,020	517	738	.228	.26	A.
September	940	631	757	.234	.26	A.
October	865	601	694	.215	.25	B.
November	631	....	557	.172	.19	C.
December	....	....	450	.139	.16	C.
The year	6,920	....	831	.257	3.50	

NOTE.—See footnotes to table of daily discharge.

LONG PRAIRIE RIVER NEAR MOTLEY, MINN.

Location.—100 yards above the highway bridge which is 1 mile south of Motley, in sec. 19, T. 133 N., R. 31 W., and 2 miles above the mouth of the river.

Records available.—June 10, 1909, to December 31, 1912.

Drainage area.—973 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from the bridge at all except low stages; low-water measurements made by wading at a short distance upstream.

Winter flow.—River is frozen over at the gage and observations are discontinued from November to March. There seems to be a close relation between the open-water discharge at this station and the flow of the Crow Wing at Pillager. The flow during the winter has therefore been estimated from the flow at Pillager, which is determined by current-meter measurements.

Accuracy.—Conditions at this station are favorable and the records should be reliable. There are no dams on the river to affect its flow at the gaging station. Back-water caused by ice gorges in Crow Wing River may possibly affect gage heights for a few days in the spring.

Discharge measurements of Long Prairie River near Motley, Minn., in 1912.

[W. G. Hoyt, hydrograher.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 10	7.80	1,530
Aug. 10	5.70	320

Daily gage height, in feet, of Long Prairie River near Motley, Minn., for 1912.

[John Green, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	6.0	5.55	6.25	5.15	5.32	5.55	5.32	5.19
2	6.05	5.41	6.3	5.15	5.35	5.55	5.32	5.12
3	6.1	5.6	6.3	5.18	5.35	5.55	5.31	5.15
4	5.95	6.8	6.3	5.16	5.34	5.50	5.30	5.15
5	6.6	8.7	6.3	5.20	5.34	5.50	5.26	5.12
6	5.85	9.95	6.2	5.28	5.36	5.48	5.29	5.18
7	5.9	9.15	6.0	5.29	5.35	5.45	5.25	5.18
8	5.9	8.7	5.8	5.24	5.42	5.42	5.25	5.16
9	5.7	8.3	5.7	5.30	5.58	5.40	5.24	5.16
10	5.55	7.8	5.6	5.34	5.70	5.40	5.25	5.16
11	5.45	7.3	5.6	5.35	5.80	5.36	5.26	5.15
12	5.40	7.0	5.5	5.31	5.85	5.34	5.29	5.16
13	5.35	6.7	5.5	5.29	5.80	5.36	5.29	5.11
14	5.38	6.5	5.5	5.30	5.75	5.35	5.29	5.08
15	5.41	6.35	5.6	5.24	5.75	5.35	5.28	5.11
16	5.55	6.15	5.7	5.21	5.70	5.36	5.25	5.14
17	5.50	6.0	5.8	5.20	5.70	5.38	5.25	5.20
18	5.45	5.9	5.75	5.20	5.65	5.36	5.26	5.14
19	5.40	5.85	5.7	5.16	5.65	5.35	5.22	5.14
20	5.35	5.8	5.6	5.15	5.60	5.35	5.22	5.12
21	5.32	5.8	5.55	5.16	5.55	5.34	5.22	5.12
22	5.31	5.8	5.5	5.19	5.55	5.32	5.21	5.15
23	5.30	5.85	5.41	5.21	5.50	5.32	5.20	5.11
24	5.28	5.85	5.38	5.30	5.46	5.32	5.20	....
25	5.28	5.8	5.34	5.42	5.45	5.35	5.20	....
26	5.34	5.8	5.29	5.50	5.42	5.35	5.19	....
27	5.48	5.95	5.25	5.50	5.38	5.38	5.19	....
28	5.5	6.0	5.24	5.44	5.36	5.36	5.21	....
29	5.55	6.05	5.21	5.35	5.32	5.35	5.22	....
30	5.55	6.1	5.20	5.31	5.49	5.35	5.20	....
31	....	6.2	....	5.31	5.51	....	5.20	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 31, and about Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Long Prairie River near Motley, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	480	270	612	135	185	270	185	145
2	505	216	640	135	195	270	185	127
3	530	290	640	143	195	270	181	135
4	455	920	640	138	192	250	178	135
5	805	2,100	640	148	192	250	166	127
6	405	2,960	585	172	198	242	175	143
7	430	2,400	480	175	195	231	163	143
8	430	2,100	380	160	220	220	163	138
9	333	1,840	333	178	282	212	160	138
10	270	1,520	290	192	333	212	163	138
11	231	1,220	290	195	380	198	166	135
12	212	1,040	250	181	405	192	175	138
13	195	860	250	175	380	198	175	125
14	205	750	250	178	356	195	175	117
15	216	668	290	160	356	195	172	125
16	270	558	333	151	333	198	163	132
17	250	480	380	148	333	205	163	148
18	231	430	356	148	312	198	166	132
19	212	405	333	138	312	195	154	132
20	195	380	290	135	290	195	154	127
21	185	380	270	138	270	192	154	127
22	181	380	250	145	270	185	151	135
23	178	405	216	151	250	185	148	125
24	172	405	205	178	235	185	148	....
25	172	380	192	220	231	195	148	....
26	192	380	175	250	220	195	145	....
27	242	455	163	250	205	205	145	....
28	250	480	160	227	198	198	151	....
29	270	505	151	195	185	195	154	....
30	270	530	148	181	246	195	148	....
31	....	585	....	181	254	....	148	....

NOTE.—Daily discharge computed from a well-defined rating curve. Daily discharge Jan. 1 to Mar. 31 and Nov. 24 to Dec. 31, estimated, because of ice, from climatologic records and open-water relation between Crow Wing River at Pillager and Long Prairie River near Motley, as follows: Jan. 1-31, 105 second-feet; Feb. 1-29, 100 second-feet; Mar. 1-31, 120 second-feet; Nov. 24-30, 120 second-feet; varying from about 125 to 115 second-feet; Dec. 1-31, 100 second-feet. Discharge at Motley taken as 0.30 time discharge at Pillager, except for December.

Monthly discharge of Long Prairie River near Motley, Minn., for 1912.

[Drainage area, 975 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	105	0.108	0.12	
February	....	....	100	.103	.11	
March	....	....	120	.123	.14	
April	805	172	299	.307	.34	B.
May	2,960	216	848	.870	1.00	A.
June	640	148	340	.349	.39	A.
July	250	135	171	.175	.20	A.
August	405	185	265	.272	.31	A.
September	270	185	211	.216	.24	A.
October	185	145	162	.166	.19	A.
November	148	....	130	.133	.15	B.
December	....	....	100	.103	.12	
The year	2,960	....	238	.244	3.31	

NOTE.—See footnotes to table of daily discharge.

SAUK RIVER NEAR ST. CLOUD, MINN.

Location.—At highway bridge 3 miles west of St. Cloud in sec. 9, T. 124 N., R. 28 W., 10 miles below the nearest tributary, which enters at Rockville.

Records available.—July 8, 1909, to December 31, 1912.

Drainage area.—816 square miles.

Gage.—Chain gage, attached to bridge; datum unchanged. Gage is read twice a day, and the mean of the readings is recorded as the mean for the day.

Channel.—Shifting during high water.

Discharge measurements.—Made from bridge.

Artificial control.—At Cold Spring, about 15 miles above the gaging station, the Farmers Milling Co. has an 8-foot masonry dam. During the fall of the year the plants are operated continuously, at other times about 10 hours each day. The fluctuation caused by the operation of the dam is observable at the gage.

Winter flow.—Owing to the fluctuation of stage caused by the operation of the power plant, alternate freezing and flooding causes ice to form to such an extent that it is impossible to obtain accurate measurements. The flow is also so irregular that it is believed that monthly means deduced from measurements and gage heights would be apt to be in error, as would also monthly means based on flow of adjoining streams. Winter gage-height readings and measurements have therefore been discontinued, beginning with December 1, 1912.

Accuracy.—Owing to the various conditions mentioned above, the records can not be considered better than fair.

Discharge measurements of Sauk River near St. Cloud, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 26[a]	S. B. Soulé	8.46	30.8	Oct. 15	W. G. Hoyt	6.16	165
Mar. 1[b]	do	8.12	16.4	15	do	6.13	156
Aug. 15	do	6.35	199	Nov. 20	do	5.97	116
15[c]	do	6.27	168				

[a] Complete ice cover; average distance water surface to bottom of ice, 3.08 feet; average thickness of ice, 3.37 feet.

[b] Complete ice cover; average distance water surface to top of ice, 0.24 foot.

[c] Measurement made under bridge by wading.

Daily gage height, in feet, of Sauk River near St. Cloud, Minn., for 1912.

[Ida Waite, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	6.6		8.1		7.2	7.2	5.52	5.98	5.68	6.35	
2		8.5			7.4	7.2	5.82	6.20	5.60	6.30	
3					7.4	7.1	5.95	6.02	5.40	6.35	
4			8.1		7.4	7.0	5.65	6.45	5.40	6.30	
5	8.0	8.2			7.4	6.85	5.68	6.18	5.25	6.30	
6				6.10	7.4	6.8	5.85	6.45	5.38	6.40	
7				6.32	7.4	7.0	5.95	6.60	5.46	6.35	6.00
8	6.8			6.25	7.4	6.60	5.75	6.50	5.50	6.25	6.05
9		8.2	8.1	6.7	7.4	6.42	6.00	6.45	5.80	6.20	5.95
10				6.7	7.6	6.40	5.90	6.32	5.80	6.05	5.85
11				6.60	8.7	6.42	6.02	6.28	5.95	6.10	5.40
12	8.2	8.1	8.1	6.45	8.3	6.32	6.08	6.28	6.15	6.15	6.10
13				6.65	8.4	6.60	5.98	6.22	6.05	5.30	5.85
14				6.65	8.2	6.42	5.90	6.39	6.10	5.35	5.70
15	7.9			6.6	8.3	6.42	5.62	6.32	6.15		5.75

Daily gage height, in feet, of Sauk River near St. Cloud, Minn., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16	....	8.0	8.4	6.50	8.4	6.40	5.55	6.50	6.60	....	5.90
17	....	....	....	6.45	8.1	6.18	5.90	5.98	6.60	....	5.65
18	....	....	....	6.8	8.1	6.10	5.92	6.05	6.60	....	5.50
19	8.8	8.0	8.9	6.75	8.2	6.08	5.95	6.14	6.60	....	5.75
20	....	....	....	6.50	8.2	6.15	6.00	6.70	6.60	....	5.90
21	....	....	....	6.45	8.2	6.10	6.08	6.60	6.45	....	6.05
22	8.6	....	....	6.30	8.2	6.12	5.62	6.60	6.25	....	6.00
23	....	....	....	6.45	8.2	6.10	6.10	6.45	6.45	....	6.15
24	....	8.3	....	6.65	8.2	5.80	6.15	6.32	6.35	....	6.56
25	....	....	....	6.55	8.2	6.00	6.22	6.20	6.20	....	5.50
26	8.5	....	....	6.55	8.2	6.07	6.20	6.05	6.05	....	6.15
27	....	8.1	....	6.7	8.3	6.02	6.10	6.05	6.20	....	6.60
28	....	....	....	6.60	8.4	5.97	6.20	6.12	6.20	....	....
29	7.9	....	....	6.65	8.2	5.95	6.10	6.25	6.35	....	....
30	....	....	....	6.7	7.8	5.92	5.95	6.40	6.45	....	....
31	....	....	....	....	7.3	....	6.05	5.95	....	....	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 5, and about Nov. 21 to Dec. 31.

Daily discharge, in second-feet, of Sauk River near St. Cloud, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	610	565	24	98	54	231	....
2	....	730	565	68	149	42	215	....
3	....	730	510	92	106	18	231	....
4	....	730	455	41	224	18	215	....
5	....	730	381	45	144	5	215	....
6	166	730	358	73	224	16	248	....
7	228	730	455	92	277	24	231	120
8	206	730	277	56	241	29	199	132
9	356	730	215	102	224	75	183	109
10	356	860	208	82	183	75	142	88
11	317	1,620	215	106	171	104	155	20
12	266	1,320	183	120	171	152	169	144
13	336	1,400	277	98	155	126	14	88
14	336	1,250	215	82	205	139	19	61
15	317	1,320	215	37	183	152	....	69
16	282	1,400	208	28	252	312	....	98
17	266	1,180	144	82	104	312	....	53
18	400	1,180	124	86	120	312	....	32
19	378	1,250	120	92	142	312	....	69
20	282	1,250	136	102	333	312	....	98
21	266	1,250	124	120	289	255	....	....
22	220	1,250	129	37	289	189	....	....
23	266	1,250	124	124	234	255	....	....
24	336	1,250	64	136	192	221	....	....
25	300	1,250	102	155	157	174	....	....
26	300	1,250	117	149	120	134	....	....
27	356	1,320	106	124	120	174	....	....
28	317	1,400	96	149	136	174	....	....
29	336	1,250	92	124	171	221	....	....
30	356	955	86	92	218	255	....	....
31	....	625	....	113	98	....	....	....

NOTE.—Daily discharge computed from rating curves fairly well defined between 100 and 700 second-feet. A change in rating curve was made on May 11 and the new curve used by indirect methods from Aug. 16 to Oct. 14. Discharge Oct. 15 to Nov. 6 estimated, because gage was not read, from the discharge measurements made Oct. 15 and Nov. 20, and a study of the records of flow at Rockford and Watson, Minn. Mean discharge Oct. 15 to 31 estimated 150 second-feet, varying from about 160 to 130 second-feet. Mean discharge Nov. 1 to 6 estimated 125 second-feet, varying from about 130 to 120 second-feet. Discharge Jan. 1 to Apr. 5, and Nov. 20 to Dec. 31 estimated, because of ice, from discharge measurements, observer's records, and climatologic records, as follows: Jan. 1-31, 60 second-feet; Feb. 1-29, 30 second-feet; Mar. 1-31, 80 second-feet; Apr. 1-5, 100 second-feet; Nov. 20-30, 1912, 75 second-feet; Dec. 1-31, 80 second-feet.

Monthly discharge of Sauk River near St. Cloud, Minn., for 1912.

[Drainage area, 816 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			60	0.074	0.09	C.
February			30	.037	.04	D.
March			80	.098	.11	C.
April	400		268	.328	.37	B.
May	1,620	610	1,080	1.32	1.52	C.
June	565	64	229	.281	.31	B.
July	155	24	91.3	.112	.13	B.
August	333	98	185	.227	.26	B.
September	312	5	155	.190	.21	C.
October	248	14	162	.199	.23	C.
November			89.4	.110	.12	C.
December			80	.098	.11	D.
The year	1,620		210	.257	3.50	

NOTE.—See footnotes to table of daily discharge.

ELK RIVER NEAR BIG LAKE, MINN.

Location.—At the highway bridge 4 miles east of Big Lake and one-half mile east of Bailey station on the Northern Pacific Railway, in sec. 23, T. 33 N., R. 27 W., one-half mile above Tibbett's Brook and 4 miles below mouth of St. Francis River.

Records available.—April 15, 1911, to December 31, 1912.

Drainage area.—615 square miles.

Gage.—Vertical staff.

Channel.—The channel is apt to shift in periods of extremely high water. During low water the relation of gage height to discharge is practically permanent, except for periods of extremely low water, when backwater may possibly be caused by the growth of vegetation.

Discharge measurements.—Made from highway bridge at all stages except low, when measurements are made by wading near by.

Winter flow.—From December to March the relation between gage height and discharge is affected by ice, and during that period measurements are made to determine the winter discharge.

Artificial control.—The flow of the river above the station is entirely uncontrolled, as the only dam on the river is near the mouth, about 8 miles below.

Discharge measurements of Elk River near Big Lake, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 27[a]	S. B. Soulé	0.97	39	May 9	S. B. Soulé	7.99	3,650
Mar. 14[b]	W. G. Hoyt	1.34	73	9	.....do	7.86	3,770
14[b]	S. B. Soulé	1.34	72	15	W. G. Hoyt	3.30	1,030
Apr. 3[c]	C. J. Emerson	2.99	849	Aug. 2[d]	S. B. Soulé	.91	183
9	W. G. Hoyt	2.73	807	2[e]	.....do	.88	166
9	.....do	2.71	778	Dec. 21[f]	.....do	.84	95
17	S. B. Soulé	1.79	460	21[f]	.....do	.84	94
17	.....do	1.79	443				

[a] Complete ice cover; average thickness of ice, 0.92 foot; average distance water surface to top of ice, 0.09 foot.

[b] Measurement made about 600 feet below the gage. Complete ice cover; average thickness of ice, 0.77 foot; average distance water surface to top of ice, 0.02 foot.

[c] Open channel. Measurement at bridge section.

[d] Wading measurement 300 feet below gage.

[e] Wading measurement 50 feet above gage.

[f] Complete ice cover; average thickness of ice, 0.60 foot.

Daily gage height, in feet, of Elk River near Big Lake, Minn., for 1912.

[Michael Tracy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.05	1.1		2.3	1.7	2.8	0.70	0.94	1.2	0.85	0.72	0.70
2				3.1	1.65	2.6	.74	.89	1.1	.82	.72	.79
3				3.0	1.9	2.3	.74	.88	1.2	.82	.72	.79
4	1.1		1.25	3.0	2.2	2.1	.76	.88	1.25	.81	.72	.79
5		1.15		3.0	2.9	1.9	.81	.86	1.25	.80	.71	.70
6				3.0	5.0	1.7	.76	.85	1.2	.79	.70	.50
7			1.3	3.0	9.8	1.5	.71	.84	1.1	.78	.70	
8	1.0	1.2		2.9	9.3	1.4	.69	.82	1.15	.79	.70	
9				2.7	7.8	1.3	.70	.82	1.1	.80	.70	
10				2.5	6.2	1.2	.72	.82	1.05	.79	.70	
11	.95		1.3	2.3	5.5	1.1	.69	.82	1.05	.78	.70	
12		1.25		2.2	4.8	1.05	.74	.81	1.0	.85	.70	.74
13				2.1	4.1	1.05	.79	.78	.96	.90	.70	
14			1.35	2.2	3.7	1.1	.78	.76	.95	.86	.70	
15	.95	1.25		1.9	3.3	1.1	.75	.74	.95	.85	.71	
16				1.85	2.9	1.05	.75	.74	.95	.81	.70	
17				1.8	2.6	1.0	.74	1.0	.94	.80	.70	
18	.95		1.35	1.8	2.4	.99	.71	1.1	.92	.80	.70	
19		1.25		1.8	2.2	1.0	.69	.98	.91	.80	.70	1.0
20				1.7	2.1	.98	.68	.92	.96	.78	.70	
21			1.4	1.7	2.1	.95	.68	.90	.96	.78	.70	.84
22	.90	1.3		1.65	2.2	.92	.68	.86	.94	.78	.70	
23				1.6	2.6	.92	.89	.84	.91	.76	.70	
24				1.55	2.8	.91	.95	.79	.90	.75	.59	
25	.95		1.45	1.5	2.8	.89	.88	.76	.94	.75	.50	
26		1.3		1.6	2.9	.84	.81	.74	.94	.75	.61	.9
27	.95			1.55	3.4	.79	.86	.71	.91	.75	.90	
28			1.8	1.5	3.8	.76	1.05	.84	.89	.74	1.1	
29	1.05	1.25	2.1	1.65	3.7	.74	1.2	.81	.88	.72	.92	
30			2.4	1.7	3.4	.71	1.1	1.3	.86	.72	.98	
31			2.3		3.1		1.0	1.25		.72		

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to Apr. 3, Nov. 15, and Nov. 27 to Dec. 31. The observer reported as follows: Mar. 28, ice began to break up; Mar. 31, ice broke up, but did not jam; Apr. 1, ice jam above gage; Apr. 3, river open; Nov. 27, river partly frozen over; backwater at gage.

Daily discharge, in second-feet, of Elk River near Big Lake, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	500	426	805	124	184	260	161	129
2	700	410	735	134	171	230	153	129
3	850	491	630	134	169	260	153	129
4	885	595	560	138	169	276	151	129
5	885	845	491	151	164	276	148	126
6	885	1,860	423	138	161	260	146	124
7	885	4,970	356	126	158	230	143	124
8	845	4,620	324	122	153	245	146	124
9	770	3,600	292	124	153	230	148	124
10	700	2,570	260	129	153	215	146	124
11	630	2,150	230	122	153	215	143	124
12	595	1,740	215	131	151	200	161	124
13	560	1,380	215	146	143	190	174	124
14	595	1,180	230	143	138	187	164	124
15	491	1,000	230	136	134	187	161	124
16	474	845	215	136	134	187	151	124
17	458	735	200	134	200	184	148	124
18	458	665	197	126	230	179	148	124
19	458	595	200	122	195	177	148	124
20	426	560	195	119	179	190	143	124

Daily discharge, in second-feet, of Elk River near Big Lake, Minn., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21	426	560	187	119	174	190	143	124
22	410	595	179	119	164	184	143	124
23	395	735	179	171	158	177	138	124
24	380	805	177	187	146	174	136	98
25	365	805	171	169	138	184	136	78
26	395	845	158	151	134	184	136	102
27	380	1,050	146	164	126	177	136	100
28	365	1,230	138	215	158	171	134	98
29	410	1,180	134	260	151	169	129	96
30	426	1,050	126	230	292	164	129	94
31		925		200	276		129	

NOTE.—Daily discharge computed from a rating table well defined between 100 and 1,300 second-feet and fairly well defined between 1,300 and 4,000 second-feet. Discharge Jan. 1 to Apr. 3, Nov. 15 (backwater from anchor ice in morning), and Nov. 27 to Dec. 31 estimated, because of ice, from climatologic records and records of discharge in adjacent drainage areas, as follows: Jan. 1–31, 60 second-feet, varying from about 110 to 30 second-feet; Feb. 1–29, 50 second-feet, varying from about 40 to 60 second-feet; Mar. 1–31, 90 second-feet, varying from about 60 to 400 second-feet; Dec. 1–31, 95 second-feet.

Monthly discharge of Elk River near Big Lake, Minn., for 1912.

[Drainage area, 615 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			60	0.098	0.11	C.
February			50	.081	.09	C.
March			90	.146	.17	C.
April	885	365	567	.922	1.03	A.
May	4,970	410	1,320	2.15	2.48	A.
June	805	126	287	.467	.52	A.
July	260	119	149	.242	.28	A.
August	292	126	168	.273	.31	A.
September	276	164	205	.333	.37	A.
October	174	129	146	.237	.27	A.
November	129	78	118	.192	.21	B.
December			95	.154	.18	C.
The year	4,970		272	.442	6.02	

NOTE.—See footnotes to tables of daily gage height and daily discharge.

CROW RIVER AT ROCKFORD, MINN.

Location.—At the highway bridge at Rockford, a little more than a mile below the junction of the North and South branches. Between the junction and the station are the outlets of Rebecca Lake and Lake Sarah, both very small streams.

Records available.—June 4, 1909, to December 31, 1912.

Drainage area.—2,520 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—During high and medium stages discharge measurements are made from the bridge, but during low stages measurements are made by wading at various sections several hundred yards downstream.

Winter flow.—Prior to the winter of 1911 and 1912, ice formed very little, and the open-water rating curve was applicable throughout the year. During the winter periods 1911–12, 1912–13 ice has destroyed the relation between stage and discharge, making it necessary to base estimates on discharge measurements. A possible reason for the present formation of ice is that before the dam was destroyed the larger body of water back of the dam was at a temperature considerably above freezing, and as it was released did not freeze quickly. Since the dam was destroyed natural conditions are present and ice forms.

Artificial control.—On the North, Middle, and South forks of Crow River are seven small power plants. These plants have small storage, and the flow at the various points is so small that no appreciable effect of their operation is observable at the gage. A dam immediately above the gage was partly destroyed May 31, 1911, and has not as yet been repaired.

Accuracy.—Conditions at this station are favorable for excellent results, and therefore the records should be reliable.

Discharge measurements of Crow River at Rockford, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 2[a]	Hoyt and Soulé	5.06	53
Mar. 15[b]	Soulé and Murphy	5.13	[c] 83
May 16	W. G. Hoyt	8.55	[c] 2,330

[a] Complete ice cover; average thickness of ice, 0.83 foot; average distance water surface to top of ice, 0.00 foot.

[b] Complete ice cover; average thickness of ice, 0.81 foot; average distance water surface to top of ice, 0.03 foot.

[c] Measurement made about 400 feet downstream from gage.

Daily gage height, in feet, of Crow River at Rockford, Minn., for 1912.

[G. W. Florida, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.15	4.80	5.5	10.3	6.1	7.5	5.24	5.7	6.6	5.6	5.18	5.25
2	5.15	4.80	5.40	8.4	6.05	7.4	5.19	5.65	6.6	5.55	5.16	5.20
3	5.15	4.80	5.25	7.7	6.25	7.2	5.16	5.6	6.6	5.5	5.14	5.12
4	5.10	4.80	5.25	7.5	7.0	7.0	5.20	5.52	6.5	5.49	5.11	5.04
5	5.10	4.85	5.25	7.4	8.0	6.6	5.24	5.52	6.5	5.45	5.10	5.00
6	5.05	4.85	5.20	7.1	8.7	6.3	5.34	5.54	6.4	5.41	5.08	5.00
7	5.00	4.80	5.30	6.8	9.2	6.2	5.28	5.6	6.3	5.36	5.08	5.08
8	5.00	4.80	5.40	6.5	9.6	6.1	5.24	5.75	6.2	5.32	5.08	5.15
9	4.90	4.80	5.35	6.35	9.9	6.0	5.31	6.0	6.15	5.32	5.08	5.30
10	4.90	4.75	5.35	6.2	10.2	5.85	5.36	6.1	6.1	5.30	5.08	5.04
11	4.85	4.75	5.25	6.1	10.0	5.7	5.40	6.3	6.0	5.45	5.12	5.04
12	4.80	4.75	5.10	6.0	9.9	5.6	5.46	6.6	5.9	5.5	5.12	5.04
13	4.80	4.75	5.05	5.9	9.7	5.65	5.9	6.9	5.8	5.49	5.12	5.04
14	4.70	4.75	5.00	6.1	9.3	5.75	5.85	6.8	5.8	5.45	5.08	4.99
15	4.65	4.80	5.00	6.25	9.0	5.85	5.8	6.8	5.8	5.41	5.04	4.98
16	4.65	4.80	4.90	6.2	8.6	5.85	5.7	6.7	5.8	5.40	5.02	5.00
17	4.65	4.80	4.95	6.1	8.4	5.75	5.6	6.9	5.8	5.36	5.02	5.01
18	4.65	4.80	4.95	6.0	8.1	5.7	5.48	7.1	5.8	5.34	5.02	4.99
19	4.65	4.80	5.00	5.9	7.8	5.7	5.42	7.2	5.75	5.32	5.04	4.98
20	4.65	4.80	5.10	5.8	7.6	5.65	5.5	7.3	5.75	5.30	5.06	4.97
21	4.65	4.85	5.45	5.8	7.4	5.65	5.5	7.2	5.7	5.30	5.08	4.98
22	4.65	4.85	5.9	5.9	7.4	5.6	5.55	7.2	5.7	5.28	5.08	4.98
23	4.65	4.85	5.85	5.85	7.2	5.6	5.95	7.1	5.7	5.26	5.09	4.98
24	4.70	4.85	5.75	5.85	7.1	5.55	6.25	7.0	5.7	5.24	5.06	4.96
25	4.70	4.90	5.75	5.8	7.1	5.5	6.25	6.9	5.7	5.23	5.04	4.95
26	4.75	4.90	6.15	5.9	7.2	6.0	6.2	6.8	5.65	5.22	5.02	4.94
27	4.70	4.90	6.65	6.1	7.3	5.9	6.1	6.7	5.65	5.22	5.02	4.95
28	4.70	5.00	7.80	6.25	7.4	5.65	6.0	6.6	5.6	5.22	5.00	4.96
29	4.75	5.55	8.70	6.25	7.4	5.46	6.0	6.6	5.6	5.23	4.98	4.97
30	4.80	......	9.20	6.2	7.5	5.30	5.9	6.7	5.6	5.22	4.99	4.98
31	4.80	......	9.65	......	7.5	......	5.85	6.7	......	5.20	......	4.98

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 1, Dec. 7 to 13 and 29 to 31.

Daily discharge, in second-feet, of Crow River at Rockford, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,500	665	1,570	233	445	965	395	209	237
2	2,270	638	1,500	213	420	965	370	202	217
3	1,710	755	1,360	202	395	965	345	194	187
4	1,570	1,220	1,220	217	355	905	340	183	158
5	1,500	1,950	965	233	355	905	322	179	144
6	1,290	2,510	785	274	365	845	304	172	144
7	1,100	2,950	725	249	395	785	283	172	144
8	905	3,310	665	233	472	725	266	172	144
9	815	3,580	610	261	610	695	266	172	144
10	725	3,850	528	283	665	665	257	172	143
11	665	3,670	445	300	785	610	322	187	143
12	610	3,580	395	327	965	555	345	187	142
13	555	3,400	420	555	1,160	500	340	187	142
14	665	3,040	472	528	1,100	500	322	172	141
15	755	2,770	528	500	1,100	500	304	158	138
16	725	2,430	528	445	1,030	500	300	151	144
17	665	2,270	472	395	1,160	500	283	151	148
18	610	2,030	445	336	1,290	500	274	151	141
19	555	1,790	445	309	1,360	472	266	158	138
20	500	1,640	420	345	1,430	472	257	165	134
21	500	1,500	420	345	1,360	445	257	172	138
22	555	1,500	395	370	1,360	445	249	172	138
23	528	1,360	395	582	1,290	445	241	176	138
24	528	1,290	370	755	1,220	445	233	165	131
25	500	1,290	345	755	1,160	445	229	158	128
26	555	1,360	610	725	1,100	420	225	151	125
27	665	1,430	555	665	1,030	420	225	151	128
28	755	1,500	420	610	965	395	225	144	131
29	755	1,500	327	610	965	395	229	138	131
30	725	1,570	257	555	1,030	395	225	141	131
31	....	1,570	....	528	1,030	....	217	....	130

NOTE.—Daily discharge computed from a well-defined rating curve. Discharge Jan. 1 to Apr. 1, Dec. 7 to 13, and Dec. 29 to 31 estimated, because of ice, on basis of climatologic records, discharge measurements, and gage heights, as follows: Jan. 1–13, 100 second-feet, varying from about 110 to 80 second-feet; Jan. 14–31, 60 second-feet, varying from about 70 to 55 second-feet; Feb. 1–29, 70 second-feet, varying from about 55 to 100 second-feet; Mar. 1–15, 90 second-feet, varying from about 100 to 83 second-feet; Mar. 16–31, 630 second-feet, varying from about 80 to 3,000 second-feet.

Monthly discharge of Crow River at Rockford, Minn., for 1912.

[Drainage area, 2,520 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	60	0.024	0.03	C.
February	....	....	70	.028	.03	C.
March	....	....	380	.151	.17	C.
April	[a] 3,500	500	925	.367	.41	B.
May	3,850	638	2,060	.817	.94	A.
June	1,570	257	620	.246	.27	A.
July	755	202	417	.165	.19	A.
August	1,430	355	915	.363	.42	A.
September	965	395	593	.235	.26	A.
October	395	217	281	.112	.13	A.
November	209	138	169	.067	.07	A.
December	....	....	146	.058	.07	B.
The year	3,850	....	556	.221	2.99	

[a] Estimated.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

SOUTH FORK OF CROW RIVER NEAR ROCKFORD, MINN.

Location.—At the highway bridge 3½ miles southwest of Rockford in sec. 1, T. 118 N., R. 25 W.; no tributaries within several miles.

Records available.—June 15, 1909, to March 31, 1912. Station discontinued March 31, 1912.

Drainage area.—1,160 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Slightly shifting.

Discharge measurements.—Made from the bridge except at low stages, when they are made by wading at a short distance upstream.

Winter flow.—Ice forms, varying in thickness from 1 to 2 feet. Winter estimates based on gage heights, climatological data, and results of discharge measurements.

Artificial control.—The nearest dam is that at Delano, which is merely used as diversion dam by the Great Northern Railway Co.

The following discharge measurement was made by Hoyt and Soulé:

February 2, 1912: Gage height, 1.42 feet; discharge, 5.6 second-feet. This measurement was made under complete ice cover; average thickness of ice, 1.03 feet; average distance water surface to top of ice, 0.01 foot.

Daily gage height, in feet, of South Fork of Crow River near Rockford, Minn., for 1912.

[Jacob Horsch, observer.]

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	1.60	1.40		16			
2				17			
3				18	1.50		1.80
4	1.55		2.0	19		1.40	
5		1.40		20			
6				21			3.3
7			2.15	22	1.50	1.40	
8	1.60	1.40		23			
9				24			
10				25	1.45		3.0
11	1.55		1.90	26		1.40	
12		1.35		27			
13				28			4.6
14			2.0	29	1.45	2.7	5.4
15	1.60	1.35		30			5.65
				31			5.85

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Mar. 31.

Monthly discharge of South Fork of Crow River near Rockford, Minn., for 1912.

[Drainage area, 1,160 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Accuracy.
	Mean.	Per square mile.		
January	20	0.017	0.02	C.
February	10	.0086	.009	C.
March	110	.095	.11	C.

NOTE.—Monthly discharge Jan. 1 to Mar. 30 estimated, because of ice, from climatologic records, discharge of adjacent drainage areas, discharge measurements, and semiweekly gage heights, as follows: Jan. 1–31, 20 second-feet, varying from about 35 to 6 second-feet. Feb. 1–29, 10 second-feet, varying from about 6 to 15 second-feet. Mar. 1–18, 20 second-feet, varying from about 15 to 25 second-feet. Mar. 19–31, 120 second-feet, varying from about 25 to 600 second-feet.

RUM RIVER AT ONAMIA, MINN.

Location.—At the steel highway bridge at Onamia, 200 yards below the outlet of Lake Onamia and 5 miles above the mouth of Bradbury Brook.

Records available.—September 24, 1909, to December 31, 1912.

Drainage area.—414 square miles, of which 207 square miles are taken up by the water surface of Mille Lacs Lake.

Gage.—Vertical staff. The gage was located originally at the wooden highway bridge just below the Soo Railway bridge, but May 4, 1910, this bridge was destroyed and the gage moved 200 yards downstream to the steel highway bridge. The new gage was set to read the same as the old one.

Channel.—The bed of the river is mostly sand or fine gravel filled with débris, logs and grass.

Discharge measurements.—Made from the steel highway bridge.

Winter flow.—During the winter period of 1911 and 1912 the river froze solid to the bottom and there was no flow.

Artificial control.—Two miles below Onamia is an abandoned logging dam which raises the water level about 3 feet but does not control the flow. As there is a good fall to the river the influence of this dam does not reach the gaging station. Owing to the natural storage afforded by the lakes the range of stage at Onamia is slight.

Accuracy.—Because of very poor natural conditions, the great liability of the channel to shift, and backwater caused by growth of grass, the records are not considered better than fair.

Discharge measurements of Rum River at Onamia, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 11	S. B. Soulé	1.31	172	June 27[a]	S. B. Soulé	.72	30.5
11	do	1.31	174	Nov. 20[a]	W. G. Hoyt	.17	5.7
June 27[a]	do	.72	32.9				

[a] Measurements made by wading at a short distance below the Soo Railway bridge.

Daily gage height, in feet, of Rum River at Onamia, Minn., for 1912.

[R. Swedburg, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	0.20	0.65	0.88	0.70	0.45	0.50	0.35	0.25
2	.32	.68	.88	.70	.42	.50	.35	.25
3	.35	.75	.88	.68	.40	.50	.32	.25
4	.42	.85	.85	.68	.40	.50	.32	.25
5	.45	.95	.82	.65	.38	.50	.32	.25
6	.50	1.2	.82	.65	.40	.48	.30	.25
7	.52	1.3	.80	.62	.42	.48	.30	.22
8	.55	1.4	.78	.60	.45	.48	.30	.22
9	.60	1.35	.78	.58	.48	.45	.30	.22
10	.65	1.3	.75	.58	.50	.45	.30	.22
11	.68	1.3	.72	.55	.50	.45	.30	.20
12	.68	1.25	.72	.52	.50	.42	.32	.20
13	.70	1.2	.72	.50	.48	.42	.32	.20
14	.70	1.2	.72	.50	.48	.42	.32	.20
15	.70	1.15	.75	.50	.48	.40	.30	.20

Daily gage height, in feet, of Rum River at Onamia, Minn., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16	0.72	1.1	0.78	0.50	0.48	0.40	0.30	0.20
17	.72	1.1	.78	.50	.50	.40	.30	.20
18	.70	1.05	.80	.50	.48	.38	.30	.20
19	.70	1.0	.80	.48	.48	.38	.30	.18
20	.70	.98	.80	.48	.48	.35	.30	.18
21	.72	.92	.78	.48	.48	.35	.28	.18
22	.72	.92	.78	.48	.48	.32	.28	.18
23	.75	.95	.78	.50	.48	.32	.28	.15
24	.78	.92	.75	.52	.48	.30	.28	.15
25	.78	.90	.75	.50	.48	.30	.28	.15
26	.80	.90	.75	.50	.48	.32	.25	.12
27	.78	.90	.72	.50	.48	.32	.25	.12
28	.75	.90	.72	.48	.45	.35	.25	.10
29	.70	.90	.70	.48	.48	.35	.25	.10
30	.68	.90	.70	.45	.50	.32	.25	.08
31	....	.90	....	.45	.50	....	.25	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 31, and about Dec. 1 to 31.

Daily discharge, in second-feet, of Rum River at Onamia, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2	24	62	29	14	15	10	7.5
2	4.6	27	62	29	13	15	10	7.5
3	5.5	38	62	27	12	15	10	7.5
4	7.8	56	56	27	12	15	10	7.5
5	9	78	51	24	11	15	10	7.5
6	11	140	51	24	12	14	9	7.5
7	12	170	47	22	13	14	9	6.6
8	14	210	43	20	14	14	9	6.6
9	18	190	43	19	14	14	9	6.6
10	24	170	38	19	15	14	9	6.6
11	27	170	33	18	15	14	9	6.0
12	27	155	33	16	15	13	10	6.0
13	29	140	33	15	14	13	10	6.0
14	29	140	33	15	14	13	10	6.0
15	29	127	38	15	14	12	9	6.0
16	33	114	43	15	14	12	9	6.0
17	33	114	43	15	15	12	9	6.0
18	29	102	47	15	14	11	9	6.0
19	29	89	47	14	14	11	9	5.6
20	29	84	47	14	14	10	9	5.6
21	33	71	43	14	14	10	8.4	5.6
22	33	71	43	14	14	10	8.4	5.6
23	38	78	43	15	14	10	8.4	5.0
24	43	71	38	16	14	9	8.4	5.0
25	43	66	38	15	14	9	8.4	5.0
26	47	66	38	15	14	10	7.5	4.4
27	43	66	33	15	14	10	7.5	4.4
28	38	66	33	14	14	10	7.5	4.0
29	29	66	29	14	14	10	7.5	4.0
30	27	66	29	14	15	10	7.5	3.6
31	....	66	....	14	15	....	7.5	....

NOTE.—Daily discharge computed from 2 rating curves fairly well defined, between 29 and 210 second-feet. Discharge Jan. 1 to Mar. 31, 1912, and Dec. 1 to 31, estimated, because of ice, from climatologic records, records of discharge of adjacent drainage areas, and observer's reports, as follows: Jan. 1 to Feb. 29, 0 second-foot; Mar. 1–31, 2 second-feet, varying about 0 to 4 second-feet; Dec. 1–31, 2 second-feet.

Monthly discharge of Rum River at Onamia, Minn., for 1912.

[Drainage area, 414 square miles.][a]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	....	....	0.00	
February	....	....	.00	
March	....	....	2.0	
April	47	2	25.9	D.
May	210	24	99.7	B.
June	62	29	42.6	B.
July	29	14	17.8	C.
August	15	11	13.8	D.
September	15	9	12.1	D.
October	10	7.5	8.87	C.
November	7.5	3.6	5.91	C.
December	....	....	2.0	
The year	210	....	19.3	

[a] "Discharge in second-feet per square mile" and "Run-off (depth in inches)" computed from this drainage area are considered misleading, especially during low-water periods, because of the large amount of lake storage, and are therefore not published.

NOTE.—See footnotes to table of daily discharge.

RUM RIVER AT CAMBRIDGE, MINN.

Location.—At highway bridge one-half mile west of Cambridge. No tributary within several miles.

Records available.—June 12, 1909, to December 31, 1912.

Drainage area.—1,160 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Shifting.

Discharge measurements.—Made from the bridge.

Winter flow.—From December to March discharge measurements are made through ice to determine the winter flow.

Artificial control.—At St. Francis, 20 miles below Cambridge by river, there is a 10-foot dam and a power plant. Between the crest of the dam and the water surface at the gaging station there is a difference in elevation of about 6 feet. The fact that morning and evening gage heights during the low-water period show no consistent change, being for the most part the same, indicates that the St. Francis dam has very little effect on the flow at this station, even though the flow may fall below the crest during certain portions of the day. The only dam above Cambridge is at Milaca, which is used to form a pool from which water is pumped. Flow at Cambridge, especially during periods of low water, is controlled by the storage in and evaporation from the lakes in the drainage area above Onamia.

Accuracy.—During the summer of 1911 and 1912 grass grew in the channel to such an extent that it caused backwater in varying amount at the gage. Therefore during that period the records can not be considered better than fair. Records for the remainder of the year are believed to be good.

Discharge measurements of Rum River at Cambridge, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 30[a]	S. B. Soulé	3.61	66.0	Aug. 1	S. B. Soulé	3.85	177
Mar. 13[b]	Hoyt and Soulé	3.61	74	Sept. 12[c]	....do	3.80	168
13[b]	....do	3.61	74	12[d]	....do	3.79	165
Apr. 18	S. B. Soulé	6.30	983	Oct. 11	W. G. Hoyt	3.12	121
18	....do	6.32	978	Nov. 23	....do	2.99	116
May 14	W. G. Hoyt	10.36	2,370	Dec. 30[e]	S. B. Soulé	3.34	84

[a] Complete ice cover; average thickness of ice, 1.18 feet; average distance water surface to top of ice, 0.06 foot.

[b] Six per cent open water, 94 per cent ice cover; average thickness of ice 1.28 feet; average distance water surface to top of ice, 0.09 foot.

[c] Wading measurement about 500 feet above gage.

[d] Wading measurement about 75 feet above gage.

[e] Complete ice cover at gage and control; 90 per cent ice cover at measuring section.

Daily gage height, in feet, of Rum River at Cambridge, Minn., for 1912.

[Joseph Lofstrom, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		3.70		6.1	7.1	8.3	3.55	3.85	4.0	3.4	3.0	3.0
2	3.50			7.1	6.7	7.5	3.50	3.7	4.4	3.4	3.0	3.1
3				8.0	6.4	6.6	3.50	3.6	5.0	3.35	3.0	3.1
4			3.60	8.6	6.7	6.1	3.55	3.55	5.4	3.3	3.0	
5	3.40	3.7		8.0	7.8	5.8	3.65	3.5	5.5	3.25	3.0	3.1
6				7.6	9.4	5.6	3.60	3.6	5.3	3.2	3.0	
7			3.6	7.4	12.7	5.3	3.55	3.6	4.9	3.15	2.99	
8	3.45	3.70		7.2	15.5	5.1	3.50	3.6	4.6	3.15	3.0	
9				7.0	16.2	4.9	3.45	3.6	4.3	3.15	3.0	
10				6.7	15.7	4.7	3.45	3.65	4.1	3.1	3.0	
11	3.50		3.60	6.4	14.4	4.5	3.40	3.6	3.9	3.15	2.99	
12		3.70		6.0	13.1	4.4	3.50	3.6	3.8	3.2	2.96	3.1
13			3.6	5.7	11.7	4.3	3.45	3.55	3.7	3.3	2.98	
14			3.60	5.6	10.4	4.3	3.40	3.55	3.65	3.25	2.98	
15	3.45	3.70		5.6	9.1	4.3	3.40	3.5	3.55	3.25	2.96	
16				5.7	8.1	4.3	3.40	3.5	3.55	3.25	2.98	
17				6.0	7.4	4.2	3.40	3.75	3.55	3.2	2.95	
18	3.50		3.6	6.3	6.9	4.2	3.35	3.9	3.5	3.2	2.95	
19		3.7		6.3	6.5	4.3	3.30	3.85	3.5	3.15	2.96	3.25
20				6.2	6.2	4.3	3.35	3.85	3.5	3.15	2.98	
21			3.60	5.8	6.0	4.2	3.30	3.8	3.5	3.1	2.98	
22	3.5	3.70		5.6	6.5	4.1	3.30	3.7	3.5	3.1	2.98	
23				5.4	7.4	4.0	3.60	3.7	3.5	3.1	2.98	
24				5.4	8.0	3.9	3.80	3.6	3.45	3.1	2.68	
25	3.55		3.60	5.5	8.5	3.9	3.80	3.6	3.5	3.05	2.92	
26		3.65		5.4	8.8	3.8	4.00	3.5	3.55	3.05	3.05	3.35
27				5.4	9.2	3.7	4.40	3.45	3.5	3.05	3.1	
28			3.85	6.0	9.2	3.7	4.60	3.45	3.45	3.0	3.1	
29	3.6	3.60	4.30	6.8	9.0	3.7	4.50	3.4	3.4	3.05	3.0	
30	3.6		4.60	7.1	9.0	3.6	4.30	3.65	3.4	3.05	3.0	3.35
31			5.00		8.8		4.00	3.9		3.0		

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 2 and about Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Rum River at Cambridge, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	500	1,220	1,600	120	178	215	150	110
2	900	1,100	1,320	110	140	320	150	110
3	1,520	1,010	1,000	110	118	500	140	110
4	1,740	1,100	870	120	108	620	140	110
5	1,520	1,460	780	140	98	650	130	110
6	1,380	2,020	710	130	118	590	130	110
7	1,320	3,320	620	120	118	470	120	110
8	1,250	4,550	560	110	118	380	120	110
9	1,190	4,900	500	100	118	290	130	110
10	1,100	4,650	440	100	129	240	120	110

Daily discharge, in second-feet, of Rum River at Cambridge, Minn., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11	1,010	4,000	390	90	118	190	130	110
12	890	3,480	360	110	118	165	140	110
13	803	2,920	320	100	108	150	160	110
14	774	2,400	320	90	108	140	150	110
15	774	1,880	320	90	98	120	150	110
16	803	1,520	320	90	98	130	160	110
17	890	1,280	290	90	152	130	140	110
18	980	1,160	290	80	190	120	140	110
19	980	1,020	320	70	178	130	130	110
20	950	910	320	80	178	130	130	115
21	832	840	290	70	165	130	120	115
22	774	1,020	260	60	140	140	120	115
23	717	1,280	240	120	140	140	120	115
24	717	1,490	210	160	118	130	120	115
25	745	1,660	210	160	118	150	110	115
26	717	1,770	190	210	98	160	110	115
27	717	1,920	170	320	88	150	110	115
28	890	1,920	160	380	88	150	100	110
29	1,130	1,840	160	350	78	140	110	110
30	1,220	1,840	140	290	129	140	120	110
31	....	1,770	....	210	190	....	110	....

NOTE.—Daily discharge computed from two fairly well defined rating curves. Shifting channel methods used May 15 to July 31 and Sept. 13 to Nov. 23. Discharge Jan. 1 to Apr. 2 and Nov. 24 to Dec. 31 estimated, because of ice, from semi-weekly gage heights, observer's notes, discharge measurements, climatologic records, and records of discharge of adjacent drainage areas, as follows: Jan. 1-31, 80 second-feet; Feb. 1-29, 70 second-feet; Mar. 1-31, 100 second-feet; Dec. 1-31, 100 second-feet, varying from about 130 to 84 second-feet.

Monthly discharge of Rum River at Cambridge, Minn., for 1912.

[Drainage area, 1,160 square miles.][a]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	....	....	80	C.
February	....	....	70	C.
March	....	....	100	C.
April	1,740	500	991	B.
May	4,900	840	2,040	B.
June	1,600	140	456	C.
July	380	60	141	C.
August	190	78	127	C.
September	650	120	237	C.
October	160	100	129	B.
November	115	110	111	C.
December	....	....	100	C.
The year	4,900	....	383	

[a] Discharge in "second-feet per square mile" and "Run-off (depth in inches)" are not published for this drainage area, because they are believed to be misleading. See "Artificial control" in station description.

NOTE.—See footnotes to table of daily discharge.

MINNESOTA RIVER NEAR ODESSA, MINN.

Location.—At highway bridge 1 mile southwest of Odessa, in sec. 32, T. 121 N., R. 45 W., one-half mile below the mouth of Stony Run, a very small stream entering from the north.

Records available.—July 4, 1909, to December 31, 1912.

Drainage area.—1,560 square miles.

Gage.—Chain gage attached to bridge, datum unchanged.

Channel.—Practically permanent except during periods of high water.

Discharge measurements.—Made from the bridge, except during low stages, when they are made at a wading section.

Winter flow.—The river is frozen over and observations are discontinued from December to March. The flow during that period may be estimated by using the run-off per square mile of adjacent drainage areas.

Artificial control.—The flow at Odessa is entirely uncontrolled. The nearest dam is at Granite Falls. Swamps may regulate the flow to a relatively small extent.

Remarks.—This station was established in order to determine the run-off from Big Stone Lake available for storage and the amount of flood water contributed by the upper valley. As Whetstone River enters Minnesota River above Odessa, a station was established on that stream also for the purpose of determining the amount of water passing Odessa from that source. Owing to its extreme flatness the valley immediately below Big Stone Lake is subject to severe overflow during high water, and it was therefore not possible to select a satisfactory station site above Odessa. Even at this point extremely high water overflows around one end of the bridge, but the amount is only a small percentage of the entire flow, and is estimated at times of high-water measurements.

Discharge measurements of Minnesota River near Odessa, Minn., in 1912.

[S. B. Soulé, hydrographer.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 9	3.46	64.0	May 5	5.10	191
9	3.44	66.5	June 21 [a]	2.76	30.7

[a] Measurement made by wading at regular section.

Daily gage height, in feet, of Minnesota River near Odessa, Minn., for 1912.

[C. P. Shellenbarger, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	6.9	3.5	2.71	2.28	3.75	....	2.89	3.05
2	6.2	3.3	2.62	2.28	3.7	....	2.80	3.0
3	6.0	3.2	2.55	2.32	3.6	2.80	2.86	3.0
4	5.5	4.4	2.46	2.49	3.5	2.76	2.85	2.95
5	4.6	5.0	2.41	3.05	3.4	2.75	2.88	2.95
6	3.85	5.8	2.36	3.2	3.3	2.76	3.0	2.94
7	3.85	6.5	2.35	3.1	3.25	2.74	2.96	2.91
8	3.55	6.0	2.31	2.90	3.2	2.78	2.95	2.90
9	3.45	5.4	2.30	2.90	3.15	2.80	2.91	2.90
10	3.35	4.2	2.30	3.00	3.05	2.78	2.90	....
11	3.25	3.85	2.54	3.15	3.0	2.75	2.90	....
12	3.2	3.65	2.49	3.4	3.0	2.78	2.85	....
13	3.25	3.5	2.58	3.4	3.0	....	2.80	....
14	3.55	3.35	2.69	3.6	3.0	....	2.80	....
15	4.4	3.25	2.59	3.8	2.78	....	2.79	....
16	5.8	3.1	2.81	3.7	2.78	....	2.84	....
17	6.6	3.0	3.0	3.7	2.86	....	2.85	2.80
18	6.1	2.95	3.2	3.5	2.89	....	3.2	2.78
19	5.1	2.90	3.2	3.45	2.90	....	3.5	2.75
20	4.0	2.85	2.81	3.5	2.92	....	3.2	2.80
21	4.2	2.80	2.78	3.3	2.96	....	2.91	2.80
22	4.0	2.80	2.68	3.3	3.0	....	2.80	2.80
23	3.9	3.6	2.61	3.4	2.89	....	2.84	2.80
24	3.75	3.25	2.59	3.55	2.90	3.4	2.85	2.80
25	3.65	3.0	2.54	3.55	2.91	3.3	2.91	2.92
26	4.8	3.0	2.48	3.5	3.0	3.0	2.90	2.92
27	4.5	2.95	2.41	3.5	2.96	2.84	2.88	2.90
28	4.2	2.90	2.38	3.5	2.95	2.80	2.81	2.90
29	3.85	2.80	2.34	3.6	2.90	2.88	3.0	2.90
30	3.7	2.80	2.29	3.65	....	2.90	3.1	....
31	....	2.75	....	3.7	....	....	3.05	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 31 and about Nov. 25 to Dec. 31.

Daily discharge, in second-feet, of Minnesota River near Odessa, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	355	70	28	14	88	34	36	44
2	288	58	25	14	84	33	32	41
3	270	52	22	15	77	32	34	41
4	225	137	19	20	70	30	34	38
5	153	185	17	44	64	30	35	38
6	94	252	16	52	58	30	41	38
7	94	315	16	46	55	30	39	36
8	74	270	14	36	52	31	38	36
9	67	217	14	36	49	32	36	36
10	61	121	14	41	44	31	36	35
11	55	94	22	49	41	30	36	35
12	52	80	20	64	41	31	34	34
13	55	70	23	64	41	30	32	34
14	74	61	28	77	41	25	32	33
15	137	55	24	91	31	22	32	33
16	252	46	32	84	31	20	34	32
17	325	41	41	84	34	18	34	32
18	279	38	52	70	36	15	52	31
19	193	36	52	67	36	13	70	30
20	105	34	32	70	37	12	52	32
21	121	32	31	58	39	15	36	32
22	105	32	27	58	41	35	32	32
23	98	77	24	64	36	50	34	32
24	88	55	24	74	36	64	34	32
25	80	41	22	74	36	58	36	32
26	169	41	20	70	41	41	36	32
27	145	38	17	70	39	34	35	31
28	121	36	16	70	38	32	32	31
29	94	32	15	77	36	35	41	30
30	84	32	14	80	35	36	46	30
31	....	30	....	84	35	....	44	....

NOTE.—Daily discharge computed from a fairly well-defined rating curve. Daily discharge Aug. 30 to Sept. 2, Sept. 13 to 23 and Nov. 10 to 16 estimated from records of discharge in adjacent drainage areas. Discharge Jan. 1 to Mar. 31 and Nov. 25 to Dec. 31 estimated, because of ice, from climatologic records and relation between open-water flow at Odessa, Lac qui Parle, Watson, and Montevideo, as follows: Jan. 1-30, 5 second-feet; Feb. 1-29, 4 second-feet; Mar. 1-31, 20 second-feet; Nov. 25-30, 31 second-feet, varying from about 32 to 30 second-feet; Dec. 1-31, 25 second-feet.

Monthly discharge of Minnesota River near Odessa, Minn., for 1912.

[Drainage area, 1,560 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	5	0.0032	0.004	
February	....	....	4	.0026	.003	
March	....	....	20	.013	.01	
April	355	52	144	.092	.10	B.
May	315	30	86.4	.055	.06	A.
June	52	14	24.0	.015	.02	B.
July	91	14	58.6	.038	.04	A.
August	88	31	45.9	.029	.03	B.
September	64	[a] 12	31.0	.020	.02	C.
October	70	32	37.9	.024	.03	B.
November	44	30	34.1	.022	.02	C.
December	....	....	25	.016	.02	
The year	355	....	43.0	.028	.36	

[a] Estimated.

NOTE.—See footnotes to table of daily discharge.

MINNESOTA RIVER NEAR MONTEVIDEO, MINN.

Location.—At the highway bridge 1 mile south of Montevideo, in sec. 19, T. 117 N., R. 40 W., a short distance below the mouth of Chippewa River.

Records available.—July 23, 1909, to December 31, 1912.

Drainage area.—6,300 square miles.

Gage.—Chain gage, attached to bridge. The datum of the gage was lowered 2 feet September 16, 1909, and 1 foot additional July 29, 1910, to avoid negative readings. All gage heights have been referred to the last datum.

Channel.—Practically permanent.

Discharge measurements.—Made from the bridge.

Winter flow.—The river is frozen over from December to March, and measurements are made through the ice to determine the winter discharge.

Artificial control.—The nearest dam is at Granite Falls, but its influence does not extend to the Montevideo station. There is no dam above the station. The discharge of Chippewa River is so much less than that of the Minnesota that the control of the former by a dam at Montevideo has very little effect on the Minnesota gage heights.

Discharge measurements of Minnesota River near Montevideo, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec. ft.*			*Feet.*	*Sec.-ft.*
Jan. 9[a]	C. J. Emerson	2.47	28.3	Apr. 8	S. B. Soulé	5.06	690
Feb. 9[b]	S. B. Soulé	2.28	6.8	June 20	.....do	4.46	537
Mar. 22[c]	.....do	3.60	105	20	W. G. Hoyt	4.46	529
Apr. 8	.....do	5.10	679	Dec. 28	S. B. Soulé	3.16	128

[a] Complete ice cover; average thickness, 1.30 feet; average distance water surface to top of ice, 0.40 foot.

[b] Complete ice cover; average thickness of ice, 1.92 feet; average distance water surface to top of ice, 0.55 foot.

[c] Complete ice cover; average thickness of ice, 0.52 foot; average depth of water on top of ice, 0.05 foot.

Daily gage height, in feet, of Minnesota River near Montevideo, Minn., for 1912.

[Margaret Hendricks, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	......	3.1	3.6	6.1	5.4	2.75	2.6	2.5	2.8	2.3	2.35
2	......	2.4	......	3.4	6.6	5.2	3.1	2.5	2.6	2.7	2.2	2.8
3	......	......	......	3.7	7.7	5.0	3.1	2.4	2.5	2.4	2.2	2.3
4	......	......	3.0	4.0	9.0	4.9	3.2	2.3	2.45	2.45	2.4	2.4
5	3.1	2.4	......	4.1	......	4.8	3.2	2.4	2.4	2.7	2.7	2.45
6	......	......	......	5.1	......	4.7	3.3	2.55	2.4	2.4	2.7	2.35
7	......	......	......	5.0	......	4.6	3.5	2.6	2.5	2.5	2.7	2.35
8	2.45	......	3.0	5.1	......	4.6	3.7	2.55	2.4	2.8	2.35	2.4
9	......	2.4	......	5.0	......	4.3	3.8	2.5	2.4	2.6	2.45	2.3
10	......	......	......	5.0	......	4.1	3.7	2.4	2.45	2.3	2.4	2.5
11	......	......	3.2	4.9	......	4.1	3.5	2.3	2.35	2.6	2.4	2.7
12	2.85	2.35	......	4.8	......	4.2	3.2	2.5	2.3	2.8	2.7	2.45
13	......	......	......	4.6	8.9	4.2	3.1	2.5	2.35	2.5	2.7	2.65
14	......	......	......	4.6	8.6	4.1	2.6	2.5	2.4	2.5	2.5	2.8
15	2.8	......	3.0	4.7	8.2	4.2	2.7	2.65	2.2	2.8	2.5	2.85
16	......	2.3	......	4.7	8.0	4.2	2.85	2.7	2.4	2.75	2.6	3.2
17	......	......	......	4.8	7.9	4.2	3.0	2.6	2.4	2.8	2.3	3.2
18	......	......	3.0	4.8	8.0	4.6	3.0	2.45	2.4	2.7	2.4	2.85
19	2.25	2.4	......	4.8	7.2	4.8	2.85	2.6	2.4	2.7	2.6	3.1
20	......	......	......	4.9	7.0	4.7	2.8	3.0	2.3	2.2	2.6	3.1
21	......	......	......	4.9	6.8	4.4	2.9	3.2	2.3	2.6	2.7	2.9
22	2.3	......	3.6	4.8	6.6	4.3	2.95	3.1	2.2	2.85	2.6	2.8
23	......	2.4	......	4.7	6.5	3.5	3.0	3.0	2.45	2.7	2.3	3.2
24	......	......	......	4.7	6.4	3.4	3.0	2.8	2.5	2.15	2.4	3.2
25	......	......	3.6	4.6	6.4	3.3	3.0	2.7	2.4	2.3	2.3	3.1
26	2.3	3.0	......	4.9	6.4	3.2	2.9	2.6	2.5	2.75	2.6	3.0
27	......	......	......	5.2	6.3	3.2	2.9	2.5	2.3	2.6	2.8	3.2
28	......	......	......	5.3	5.8	3.0	2.9	2.45	2.6	2.4	2.8	3.2
29	2.35	......	3.65	5.4	5.6	3.0	3.0	2.6	2.4	2.7	2.65	......
30	......		......	6.0	5.6	2.9	2.75	2.7	2.45	2.9	2.7	......
31	......		......	......	5.5	......	2.7	2.8	......	2.7	......	......

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 3, and about Nov. 26 to Dec. 31. Gage not read May 5 to 12, because water was above limits of gage. Observer reported maximum stage about 14 feet.

Daily discharge, in second-feet, of Minnesota River near Montevideo, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	200	1,030	807	174	156	144	181	120
2	250	1,200	745	221	144	156	168	108
3	300	1,610	685	221	132	144	132	108
4	410	2,120	656	236	120	138	138	132
5	436	2,700	627	236	132	132	168	168
6	715	3,500	599	252	150	132	132	168
7	685	4,000	571	292	156	144	144	168
8	715	3,700	571	336	150	132	181	126
9	685	3,300	489	360	144	132	156	138
10	685	2,900	436	336	132	138	120	132
11	656	2,700	436	292	120	126	156	132
12	627	2,300	462	236	144	120	181	168
13	571	2,080	462	221	144	126	144	168
14	571	1,960	436	156	144	132	144	144
15	599	1,810	462	168	162	108	181	144
16	599	1,730	462	188	168	132	174	156
17	627	1,690	462	207	156	132	181	120
18	627	1,730	571	207	138	132	168	132
19	627	1,420	627	188	156	132	168	156
20	656	1,350	599	181	207	120	108	156
21	656	1,280	516	194	236	120	156	168
22	627	1,200	489	200	221	108	188	156
23	599	1,170	292	207	207	138	168	120
24	599	1,140	271	207	181	144	102	132
25	571	1,140	252	207	168	132	120	120
26	656	1,140	236	194	156	144	174	....
27	745	1,100	236	194	144	120	156	....
28	776	984	207	194	138	156	132	....
29	807	870	207	207	156	132	168	....
30	1,000	870	194	174	168	138	194	....
31	....	838	....	168	181	....	168	....

NOTE.—Daily discharge computed from a well-defined rating curve. Daily discharge May 5 to 12 estimated from maximum stage reported by observer and discharge at other stations on the Minnesota. Discharge Jan. 1 to Apr. 3 and Nov. 26 to Dec. 31 estimated, because of ice, from climatologic records, discharge measurements, and observer's notes, as follows: Jan. 1-31, 25 second-feet, varying about 60 to 10 second-feet; Feb. 1-29, 15 second-feet, varying from about 7 to 30 second-feet; Mar. 1-31, 85 second-feet, varying from about 30 to 150 second-feet; Nov. 26-30, 125 second-feet; Dec. 1-31, 125 second-feet.

Monthly discharge of Minnesota River near Montevideo, Minn., for 1912.

[Drainage area, 6,300 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	25	0.0040	0.005	C.
February	....	....	15	.0024	.003	C.
March	....	....	85	.014	.02	C.
April	1,000	[a] 200	609	.097	.11	A.
May	[a] 4,000	838	1,820	.289	.33	B.
June	807	194	469	.074	.08	A.
July	360	156	221	.035	.04	A.
August	236	120	158	.025	.03	B.
September	156	108	133	.021	.02	B.
October	194	102	156	.025	.03	B.
November	....	....	[b] 139	.022	.02	C.
December	....	....	125	.020	.02	
The year	4,000	....	332	.053	.71	

[a] Estimated.

[b] Differs from value published in "Report of the water-resources investigation of Minnesota, 1911-1912," because of estimate of flow Nov. 26 to 30 made from information obtained after publication of Minnesota report.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

MINNESOTA RIVER NEAR MANKATO, MINN.

Location.—At Sibley Park, 2 miles above the center of Mankato, and a few hundred yards below the mouth of Blue Earth River, the nearest tributary.

Records available.—May 20, 1903, to December 31, 1912.

Drainage area.—14,600 square miles.

Gage.—Chain gage; datum unchanged.

Channel.—Fairly permanent except during periods of high water.

Discharge measurements.—Made from a boat and cable near the gage.

Winter flow.—From December to March measurements are made through the ice to determine the winter discharge.

Artificial control.—The nearest dam on the river is at Minnesota Falls, 140 miles upstream. There is no dam below the station. A dam on Blue Earth River at Rapidan, a few miles above the mouth, controls the flow of that river, but it is such a small part of the entire discharge at the Mankato station that the effect of such control is slight.

Maximum and minimum flow.—The highest known stage of the river occurred in 1881 and is shown by a well-marked line in Mankato. The stage was approximately 27 feet above the zero of the present gage. This estimate was corroborated by M. B. Haynes, city engineer of Mankato, who states that the high water occurred after the ice went out and was not caused by backwater. The corresponding discharge is approximately 65,000 second-feet. Since the establishment of the gage the highest stage recorded was 21.2 feet on June 26, 1908. The lowest stage recorded was 0.5 in 1911, when the flow was about 89 second-feet for a considerable time.

Accuracy.—Measurements made during the earlier years indicated changing conditions of flow, and accordingly the discharge for years previous to 1907 was obtained largely by the indirect method. These results can not be considered so accurate as the later ones, which are based on well-defined rating curves.

Cooperation.—Since 1906 gage heights have been furnished by United States Weather Bureau.

Discharge measurements of Minnesota River near Mankato, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 5[a]	C. J. Emerson	2.27	341	Sept. 9[e]	S. B. Soulé	1.50	440
Feb. 7[b]	S. B. Soulé	2.19	201	9[f]	do	1.48	418
June 19[c]	do	2.98	1,160	Dec. 16[g]	do	1.47	234
Aug. 30[d]	do	2.58	1,160				

[a] Complete ice cover; average thickness, 0.75 foot; average distance water surface to top of ice, 0.10 foot.

[b] Complete ice cover; average thickness of ice, 0.97 foot; average distance of water surface to top of ice, 0.00 foot. Measurement made about 600 feet below the gage.

[c] Measurement made from upstream side of highway bridge in town.

[d] Measurement made from upstream side of highway bridge in town. Very rapidly rising stage.

[e] Wading measurement about 30 feet below gage (under cable).

[f] Wading measurement about 200 feet below gage.

[g] Measurement made under complete ice cover; river about 10 per cent open at control.

Daily gage height, in feet, of Minnesota River near Mankato, Minn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	2.1	3.6	8.2	4.5	4.0	2.4	1.9	1.8	1.2	1.3	1.1
2	2.7	2.1	3.5	8.4	4.4	3.9	2.3	1.7	1.6	1.2	1.3	1.1
3	2.6	2.0	3.4	7.7	4.8	3.9	2.5	1.7	1.6	1.2	1.2	1.0
4	2.6	2.0	3.3	7.0	4.6	3.7	2.6	1.7	1.6	1.2	1.2	1.3
5	2.5	2.0	3.2	6.5	5.7	3.6	2.6	1.7	1.6	1.2	1.2	1.3
6	2.4	2.0	3.1	6.0	5.5	3.5	2.4	1.7	1.6	1.2	1.3	1.3
7	2.4	2.0	3.1	6.1	6.8	3.4	2.6	1.7	1.6	1.2	1.3	1.3
8	2.4	2.0	3.0	5.9	7.6	3.3	2.8	1.7	1.5	1.2	1.3	1.3
9	2.3	2.0	3.0	6.2	7.3	3.2	2.6	1.7	1.5	1.3	1.3	1.3
10	2.2	2.0	3.0	5.3	7.5	3.2	2.5	1.7	1.5	1.3	1.2	1.4

Daily gage height, in feet, of Minnesota near Mankato, Minn., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	2.2	2.0	3.0	5.3	7.2	3.1	2.3	1.6	1.5	1.2	1.1	1.4
12	2.1	2.0	2.7	5.3	7.4	3.1	2.6	1.6	1.4	1.4	1.2	1.4
13	2.1	2.0	2.9	5.3	7.4	3.0	2.7	1.6	1.4	1.4	1.2	1.4
14	2.1	2.0	2.9	5.2	7.3	2.9	2.5	1.5	1.4	1.4	1.3	1.4
15	2.0	2.1	2.9	5.2	7.1	3.0	2.4	1.5	1.3	1.3	1.3	1.4
16	2.0	2.2	2.9	4.9	6.8	3.0	2.4	1.5	1.4	1.3	1.2	1.3
17	2.0	2.3	2.9	4.8	6.2	3.1	2.3	1.5	1.3	1.3	1.2	1.3
18	2.0	2.4	3.5	4.9	6.1	3.0	2.3	1.6	1.4	1.3	1.1	1.4
19	2.0	2.8	3.8	5.0	6.0	3.0	2.2	1.7	1.4	1.3	1.2	1.4
20	2.0	3.1	3.8	5.1	5.5	3.0	2.3	1.6	1.4	1.3	1.2	1.4
21	2.0	3.2	3.7	4.7	5.2	3.0	2.2	1.6	1.3	1.3	1.2	1.4
22	2.0	3.2	3.7	5.1	5.1	2.9	2.1	1.8	1.3	1.3	1.2	1.4
23	2.1	3.3	3.8	5.4	4.9	2.9	2.1	2.2	1.2	1.3	1.2	1.4
24	2.1	3.7	4.0	5.3	4.8	2.8	2.1	2.4	1.2	1.3	1.0	1.3
25	2.1	3.7	4.2	5.9	4.6	2.8	2.1	2.2	1.3	1.3	1.0	1.3
26	2.1	3.7	4.7	5.3	4.6	2.8	2.1	2.1	1.3	1.3	1.1	1.3
27	2.1	3.6	4.6	5.2	4.6	2.8	2.1	2.1	1.3	1.3	1.1	1.3
28	2.1	3.6	4.7	5.3	4.3	2.5	2.1	2.0	1.3	1.3	1.1	1.3
29	2.1	3.6	4.5	5.4	4.2	2.4	2.1	1.8	1.3	1.3	1.2	1.4
30	2.1	......	6.1	5.3	4.1	2.4	2.1	1.9	1.2	1.3	1.2	1.4
31	2.1	......	7.3	......	4.1	......	2.0	1.8	......	1.3	......	1.4

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 24 and about Dec. 1 to 31.

Daily discharge, in second-feet, of Minnesota River near Mankato, Minn., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	......	3,150	2,700	2,180	910	635	580	270	320
2	......	3,530	2,590	2,080	855	525	470	270	320
3	......	7,240	3,040	2,080	970	525	470	270	270
4	......	6,080	2,810	1,890	1,030	525	470	270	270
5	......	5,310	4,170	1,800	1,030	525	470	270	270
6	......	4,590	3,900	1,710	910	525	470	270	320
7	......	4,730	5,760	1,620	1,030	525	470	270	320
8	......	4,450	7,070	1,540	1,160	525	420	270	320
9	......	4,870	6,560	1,460	1,030	525	420	320	320
10	......	3,640	6,900	1,460	970	525	420	320	270
11	......	3,640	6,400	1,380	855	470	420	270	225
12	......	3,640	6,730	1,380	1,030	470	370	370	270
13	......	3,640	6,730	1,300	1,090	470	370	370	270
14	......	3,520	6,560	1,230	970	420	370	370	320
15	......	3,520	6,240	1,300	910	420	320	320	320
16	......	3,160	5,760	1,300	910	420	370	320	270
17	......	3,040	4,870	1,380	855	420	320	320	270
18	......	3,160	4,730	1,300	855	470	370	320	225
19	......	3,280	4,590	1,300	800	525	370	320	270
20	......	3,400	3,900	1,300	855	470	370	320	270
21	......	2,920	3,520	1,300	800	470	320	320	270
22	......	3,400	3,400	1,230	745	580	320	320	270
23	......	3,770	3,160	1,230	745	800	270	320	270
24	......	3,640	3,040	1,160	745	910	270	320	180
25	2,380	4,450	2,810	1,160	745	800	320	320	180
26	2,920	3,640	2,810	1,160	745	745	320	320	225
27	2,810	3,520	2,810	1,160	745	745	320	320	225
28	2,920	3,640	2,480	970	745	690	320	320	225
29	2,700	3,770	2,380	910	745	580	320	320	270
30	4,730	3,640	2,280	910	745	635	270	320	270
31	6,560	......	2,280	......	690	580	......	320	......

NOTE.—Daily discharge computed from a rating curve fairly well defined between 180 and 16,600 second-feet (gage heights 1.0 and 12.0 feet). Discharge Jan. 1 to Mar. 24 and Dec. 1 to 31 estimated, because of ice, from climatologic records, and records of discharge in adjacent drainage areas, as follows: Jan. 1-31, 300 second-feet; varying from about 360 to 200 second-feet; Feb. 1-29, 250 second-feet; Mar. 1-24, 770 second-feet, varying from about 400 to 1,800 second-feet; Dec. 1-31, 245 second-feet.

Monthly discharge of Minnesota River near Mankato, Minn., for 1912.

[Drainage area, 14,600 square miles.]

Month.	Discharge in second feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	300	0.021	0.02	C.
February	....	....	250	.017	.02	C.
March	6,560	....	1,400	.096	.11	C.
April	8,530	2,920	4,270	.292	.33	B.
May	7,070	2,280	4,290	.294	.34	B.
June	2,180	910	1,410	.097	.11	B.
July	1,160	690	878	.060	.07	B.
August	910	420	563	.039	.04	A.
September	580	270	379	.026	.03	A.
October	370	270	310	.021	.02	B.
November	320	180	270	.018	.02	B.
December	....	....	245	.017	.02	C.
The year	8,530	....	1,210	.083	1.13	

NOTE.—See footnotes to table of daily discharge.

WHETSTONE RIVER NEAR BIG STONE, S. DAK.

Location.—At the State Line bridge, one-fourth mile southeast of Big Stone and nearly a mile above the mouth.

Records available.—September 18 1909, to November 30, 1912. Records of United States Engineer Corps, September 15, 1899, to May 4, 1904. Station permanently discontinued November 30, 1912.

Drainage area.—441 square miles.

Gage.—Vertical staff.

Channel.—Somewhat shifting during flood periods.

Discharge measurements.—Made from bridge to which gage is attached and by wading.

Winter flow.—During the period 1909–1912 the winter flow has been so low that no attempt has been made to make estimates.

Floods.—The maximum flood during the period which records have been kept occurred on April 22, 1910, and amounted to 1,300 second-feet. The flow has been above 1,000 second-feet only on three days.

Artificial control.—There are no dams on the river and the flow at the gaging station is natural.

Discharge measurements of Whetstone River near Big Stone, S. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 10	S. B. Soulé	1.48	33.6	May 5	S. B. Soulé	3.24	172
10	.....do	1.48	33.7	June 21[a]	W. G. Hoyt	1.20	19.4

[a] Measurement made by wading at about 100 feet above gage.

Daily gage height, in feet, of Whetstone River near Big Stone, S. Dak., for 1912.

[F. W. Thorndike, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	3.2	1.85	1.5	0.5	0.85	0.5	0.5	0.3
2	3.0	1.6	1.45	.5	.8	.5	.5	.3
3	2.8	1.65	1.25	.5	.65	.5	.5	.3
4	2.45	1.8	1.15	.8	.6	.5	.4	.3
5	2.0	3.6	1.1	1.2	.5	.4	.4	.3
6	1.75	4.5	1.0	1.0	.5	.4	.4	.3
7	1.7	4.0	.95	.85	.5	.4	.4	.3
8	1.6	3.0	.9	1.05	.4	.4	.4	.3
9	1.45	2.4	.9	1.2	.4	.4	.4	.3
10	1.35	2.05	.8	1.2	.4	.4	.4	.3
11	1.3	1.85	.9	1.0	.4	.4	.4	.3
12	1.25	1.8	.9	1.05	.45	.4	.4	.3
13	1.25	1.8	1.0	1.1	.5	.4	.4	.3
14	1.55	1.8	1.1	1.25	.4	.4	.4	.3
15	5.2	1.7	1.2	1.45	.4	.4	.4	.3
16	4.7	1.5	1.4	1.6	.4	.4	.4	.3
17	3.4	1.25	1.65	1.6	.4	.4	.4	....
18	2.8	1.2	1.55	1.6	.4	.4	.3	....
19	2.5	1.2	1.35	1.5	.5	.4	.3	....
20	2.15	1.2	1.25	1.4	.65	.4	.3	....
21	2.0	1.1	1.15	1.2	.65	.4	.3	....
22	1.85	1.3	1.0	1.2	.5	.4	.3	....
23	1.75	1.65	1.0	1.4	.5	.4	.3	....
24	1.7	2.0	.9	1.45	.5	.4	.3	....
25	1.75	1.75	.85	1.5	.45	.4	.3	....
26	1.85	1.55	.7	1.45	.4	.5	.3	....
27	2.2	1.45	.6	1.65	.4	.5	.3	....
28	2.8	1.7	.55	1.45	.4	.5	.3	....
29	2.6	1.95	.5	1.2	.4	.5	.3	....
30	2.45	1.65	.5	1.0	.5	.5	.3	....
31	....	1.55	....	.9	.5	....	.3	....

NOTE.—Relation of gage height to discharge affected by ice about Nov. 17 to 30.

Daily discharge, in second-feet, of Whetstone River near Big Stone, S. Dak., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	174	52	32	4.5	9.0	4.5	4.5	3.5
2	152	37	30	4.5	8.0	4.5	4.5	3.5
3	131	40	21	4.5	5.5	4.5	4.5	3.5
4	98	49	18	8.0	5.0	4.5	4.0	3.5
5	61	227	16	19	4.5	4.0	4.0	3.5
6	46	369	13	13	4.5	4.0	4.0	3.5
7	43	285	12	9.0	4.5	4.0	4.0	3.5
8	37	152	10	14	4.0	4.0	4.0	3.5
9	30	93	10	19	4.0	4.0	4.0	3.5
10	25	64	8.0	19	4.0	4.0	4.0	3.5
11	23	52	10	13	4.0	4.0	4.0	3.5
12	21	49	10	14	4.2	4.0	4.0	3.5
13	21	49	13	16	4.5	4.0	4.0	3.5
14	34	49	16	21	4.0	4.0	4.0	3.5
15	507	43	19	30	4.0	4.0	4.0	3.5
16	407	32	27	37	4.0	4.0	4.0	3.5
17	199	21	40	37	4.0	4.0	4.0	....
18	131	19	34	37	4.0	4.0	3.5	....
19	102	19	25	32	4.5	4.0	3.5	....
20	72	19	21	27	5.5	4.0	3.5	....

Daily discharge, in second-feet, of Whetstone River near Big Stone, S. Dak., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21	61	16	18	19	5.5	4.0	3.5	....
22	52	23	13	19	4.5	4.0	3.5	....
23	46	40	13	27	4.5	4.0	3.5	....
24	43	61	10	30	4.5	4.0	3.5	....
25	46	46	9.0	32	4.2	4.0	3.5	....
26	52	34	6.0	30	4.0	4.5	3.5	....
27	76	30	5.0	40	4.0	4.5	3.5	....
28	131	43	4.8	30	4.0	4.5	3.5	....
29	111	58	4.5	19	4.0	4.5	3.5	....
30	98	40	4.5	13	4.5	4.5	3.5	....
31	....	34	....	10	4.5	....	3.5	....

NOTE.—Daily discharge computed from a rating curve well defined between 5 and 467 second-feet (gage heights 0.6 and 5.0 feet). Outside of these limits the rating curve is an extension. Discharge Nov. 17 to 30, 1912, estimated, because of ice, from climatologic records and records of discharge of adjacent drainage areas at 3 second-feet.

Monthly discharge of Whetstone River near Big Stone, S. Dak., for 1912.

[Drainage area, 441 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
April	507	21	101	0.229	0.26	C.
May	369	16	69.2	.157	.18	B.
June	40	4.5	15.8	.036	.04	B.
July	40	4.5	20.9	.047	.05	B.
August	9.0	4.0	4.64	.011	.01	C.
September	4.5	4.0	4.15	.0094	.01	C.
October	4.5	3.5	3.82	.0087	.01	D.
November	....	....	3.27	.0074	.008	D.

NOTE.—See footnote to table of daily discharge.

LAC QUI PARLE RIVER AT LAC QUI PARLE, MINN.

Location.—At the highway bridge at Lac qui Parle in sec. 26, T. 118 N., R. 42 W., in Lac qui Parle County, a short distance above the mouth of Threemile Creek.

Records available.—April 27, 1910, to December 31, 1912.

Drainage area.—838 square miles.[1]

Gage.—Vertical staff; datum unchanged.

Channel.—Slightly shifting during flood stages.

Discharge measurements.—Made from the bridge.

Winter flow.—Observations are discontinued during the winter. During 1912 the flow has been estimated from the flow of the Minnesota at Montevideo and the Chippewa near Watson and one discharge measurement made Februray 22, 1913, at which time there was no flow.

Artificial control.—There are no dams on the stream which control its flow at the present time.

Accuracy.—Because of slight shifting of the channel and the fact that the rating curves are only fairly well defined, records at this station can not be considered better than fair.

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[1] Revised since 1911 report.

Discharge measurements of Lac qui Parle River at Lac qui Parle, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 9	S. B. Soulé	2.08	76
June 21	....do	2.10	107
Aug. 28[a]	....do	1.10	22.2

[a] Measurement made by wading at section about 150 feet below gage.

Daily gage height, in feet, of Lac qui Parle River at Lac qui Parle, Minn., for 1912.

[Chas. A. Gould, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	3.5	2.75	1.90	1.15	0.80	1.02	0.80	0.88
2	3.5	2.55	1.80	1.10	.78	1.00	.85	.88
3	4.7	5.1	1.75	1.05	.72	.95	.85	.88
4	3.4	3.9	1.70	1.12	.70	.90	.88	.85
5	2.75	7.6	1.65	1.20	.80	.85	.90	.85
6	2.55	7.6	1.60	1.35	.75	.80	.90	.82
7	2.4	7.2	1.52	1.15	.72	.80	.88	.90
8	2.2	6.4	1.50	1.10	.70	.75	.88	.90
9	2.1	5.4	1.42	1.05	.72	.72	.88	.90
10	2.0	4.4	1.38	1.00	.70	.70	.88	.90
11	1.90	3.9	1.35	.95	.68	.68	.85	.90
12	1.80	3.4	1.30	1.05	.80	.65	.88	.88
13	1.75	3.3	1.32	.95	.78	.62	.85	.88
14	1.75	3.0	1.35	.95	.75	.60	.85	.88
15	1.85	2.9	1.42	.92	.72	.58	.85	.90
16	1.90	2.75	1.55	.92	.75	.60	.85	.90
17	2.25	2.65	2.8	.95	.85	.62	.85	.85
18	2.4	2.6	3.4	.90	.98	.60	.90	.75
19	2.35	2.45	2.85	.85	1.02	.60	.90	.85
20	2.2	2.4	2.35	.88	1.05	.60	.98	.88
21	2.5	2.35	2.1	.85	1.08	.60	.98	.90
22	2.0	2.3	1.95	.85	1.15	.60	.88	.88
23	1.90	2.3	1.82	1.05	1.20	.60	.90	.95
24	1.90	2.25	1.72	1.10	1.12	.60	.90	.82
25	1.90	2.25	1.62	1.08	1.12	.72	.90	.85
26	2.15	2.2	1.52	1.02	1.20	.72	.88	1.00
27	2.3	2.1	1.45	1.02	1.12	.75	.88	....
28	2.2	2.05	1.35	1.05	1.10	.75	.85	....
29	3.0	2.0	1.30	1.00	1.05	.78	.88	....
30	2.85	1.95	1.20	.95	1.02	.75	.82	....
31	....	1.90	....	.88	.98	....	.85	....

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 5 and about Nov. 26 to Dec. 31.

Daily discharge, in second-feet, of Lac qui Parle River at Lac qui Parle, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	151	85	24	9	18	9	12
2	....	124	75	22	9	17	11	12
3	....	670	70	20	7	15	11	12
4	....	350	66	23	7	13	12	11
5	....	1,550	62	27	9	11	13	11
6	124	1,550	57	36	8	9	13	10
7	107	1,390	50	24	7	9	12	13
8	87	1,100	48	22	7	8	12	13
9	77	760	42	20	7	7	12	13
10	68	510	39	17	7	7	12	13
11	60	410	36	15	7	7	11	13
12	53	310	33	20	9	6	12	12
13	50	290	34	15	9	5	11	12
14	50	235	36	15	8	5	11	12
15	56	220	42	14	7	5	11	13

Daily discharge, in second-feet, of Lac qui Parle River at Lac qui Parle, Minn., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16	60	198	52	14	8	5	11	13
17	92	182	205	15	11	5	11	11
18	107	175	310	13	16	5	13	8
19	102	152	212	11	18	5	13	11
20	87	145	138	12	20	5	16	12
21	118	138	107	11	21	5	16	13
22	68	132	90	11	24	5	12	12
23	60	132	77	20	27	5	13	15
24	60	126	68	22	23	5	13	10
25	60	126	59	21	23	7	13	11
26	82	119	50	18	27	7	12	....
27	97	107	44	18	23	8	12	....
28	87	101	36	20	22	8	11	....
29	188	95	33	17	20	9	12	....
30	166	90	27	15	18	8	10	....
31	....	85	....	12	16	....	11	....

NOTE.—Daily discharge prior to May 6 computed from a rating curve fairly well defined between 12 and 375 second-feet (gage heights 1.0 and 4.0 feet), and after May 7 from a rating curve not well defined. In making the computations the rating tables were used to whole second-feet only. Discharge Jan. 1 to Mar. 31 and Nov. 26 to Dec. 31 estimated, because of ice from climatologic records, discharge measurement and comparison of record of flow at Odessa, Watson, and Montevideo, as follows: Jan. 1–31, 3 second-feet; Feb. 1–29, 2 second-feet; Mar. 1–31, 10 second-feet; Apr. 1–5, 50 second-feet; Nov. 26–30, 9 second-feet, varying from about 10 to 8 second-feet; Dec. 1–31, 5 second-feet. (Discharge measurement made Feb. 22, 1913, showed zero discharge on that date.)

Monthly discharge of Lac qui Parle River at Lac qui Parle, Minn., for 1912.

[Drainage area, 838 square miles.[a]]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	3	0.0036	0.004	
February	....	....	2	.0024	.003	
March	....	....	10	.012	.01	
April	188	....	80.5	.096	.11	C.
May	1,550	85	378	.451	.52	C.
June	310	27	76.1	.091	.10	C.
July	36	11	18.2	.022	.03	D.
August	27	7	14.0	.017	.02	D.
September	18	5	7.8	.0093	.01	D.
October	16	9	12.0	.014	.02	D.
November	15	....	11.4	.014	.02	D.
December	....	....	5.0	.0060	.007	
The year	1,550	....	51.9	.062	1.85	

[a] Revised since 1911 report.

NOTE.—See footnotes to table of daily discharge.

CHIPPEWA RIVER NEAR WATSON, MINN.

Location.—At highway bridge 2½ miles northeast of Watson, on line between secs. 10 and 15, T. 118 N., R. 41 W., 10 miles above the mouth of the river and about 2 miles below the mouth of Dry Weather Creek.

Records available.—July 6, 1909, to December 31, 1912.

Drainage area.—1,940 square miles.

Gage.—Chain gage attached to bridge; datum unchanged.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge and by wading.

Winter flow.—The flow during the period of ice in 1912 has been based on the direct relation between the flow at Montevideo and Watson supplemented by a few discharge measurements.

Artificial control.—There was formerly possibly some slight control from a flour mill working under an 8-foot head, but this dam is at present out, so that the flow is natural. There is no backwater at the station from the dam at Montevideo.

Discharge measurements of Chippewa River near Watson, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9[a]	C. J. Emerson	5.13	6.3	Apr. 9	S. B. Soulé	6.70	360
Feb. 9[b]	S. B. Soulé	5.28	1.7	June 2	W. G. Hoyt	5.24	123
Mar. 24[c]	.....do	6.07	14.6	Aug. 28[d]	S. B. Soulé	4.42	42.6

[a] Measurement made under complete ice cover; average distance water surface to bottom of ice 1.00 foot; average thickness, 1.10 feet.

[b] Complete ice cover; average thickness of ice, 2.14 feet; average distance water surface to top of ice, 0.56 foot.

[c] Section about 150 feet below gage. Complete ice cover; average thickness of ice, 1.30 feet; average distance water surface to top of ice, 0.10 foot.

[d] Wading measurement, 100 feet above gage.

Daily gage height, in feet, of Chippewa River near Watson, Minn., for 1912.

[Clifford Bonde, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			5.8	5.95	6.25	6.3	4.60	4.50	4.48	4.70	4.62
2	5.2	5.15		5.8	6.25	6.25	4.60	4.48	4.48	4.70	4.65
3				5.7	9.7	6.2	4.62	4.42	4.45	4.68	4.68
4			5.5	6.7	10.3	6.0	4.60	4.42	4.45	4.65	4.68
5		5.2		7.9	10.7	6.0	4.68	4.50	4.45	4.60	4.65
6	5.2			6.9	10.9	5.9	4.60	4.55	4.42	4.62	4.55
7			5.65	6.9	11.0	5.9	4.72	4.60	4.42	4.65	4.65
8	5.4			6.8	11.1	5.7	4.68	4.50	4.40	4.65	4.60
9	5.1	5.3		6.8	10.9	5.65	4.65	4.55	4.38	4.68	4.60
10				6.6	10.6	5.6	4.60	4.55	4.38	4.68	4.62
11	4.75		5.7	6.45	10.3	5.5	4.52		4.35	4.70	4.61
12		5.2		6.4	10.0	5.5	4.62	4.55	4.40	4.72	4.58
13					9.6	5.6	4.55	4.58	4.38	4.70	4.60
14			5.9		9.1	5.5	4.55	4.52	4.38	4.68	4.62
15	4.65	5.6			8.8	5.5	4.58	4.52	4.40	4.68	4.62
16				6.2	8.6	5.5	4.48	4.55	4.38	4.68	4.60
17				6.15	8.3	5.45	4.48	4.55	4.48	4.68	4.66
18	4.75		5.9	6.15	8.1	5.4	4.42	4.58		4.68	4.70
19				6.15	8.0	5.4	4.50	4.55	4.58	4.70	4.70
20				6.1	7.6	5.35	4.50	4.52	4.40	4.68	4.60
21			6.0	6.1	7.4	5.25	4.48	4.58	4.48	4.65	4.58
22		5.6		6.05	7.3	5.15	4.52	4.58	4.45	4.65	4.55
23				6.0	7.2		4.50	4.52	4.40	4.62	4.60
24	5.3			5.95	7.0	4.98	4.72	4.45	4.42	4.62	4.62
25			6.0	5.9	6.9	4.92	4.68	4.30	4.65	4.62	4.71
26		5.8		6.0	6.6	4.88	4.62	4.28	4.60	4.61	4.70
27	5.2			6.1	6.6	4.80	4.62		4.60	4.61	4.70
28			6.2	6.1	6.6	4.68	4.58	4.50	4.58	4.62	4.68
29				6.2	6.6	4.65	4.58	4.40	4.68	4.60	4.65
30	4.75			6.2	6.5	4.60	4.60	4.42	4.70	4.60	4.62
31					6.4		4.58	4.48		4.65	

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 4 and about Nov. 25 to Dec. 31.

Daily discharge, in second-feet, of Chippewa River near Watson, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		273	282	57	49	48	65	59
2		273	273	57	48	48	65	61
1		1,220	264	59	44	46	63	63
4		1,440	230	57	44	46	61	63
5	650	1,580	230	63	49	46	57	61
6	403	1,640	214	57	53	44	59	53
7	403	1,680	214	67	57	44	61	61
8	381	1,720	184	63	49	43	61	57
9	381	1,640	177	61	53	42	63	57
10	340	1,540	170	57	53	42	63	59
11	310	1,440	156	51	53	40	65	58
12	300	1,330	156	59	53	43	67	55
13	291	1,190	170	53	55	42	65	57
14	282	1,020	156	53	51	42	63	59
15	273	920	156	55	51	43	63	59
16	264	860	156	48	53	42	63	57
17	255	770	149	48	53	48	63	63
18	255	710	142	44	55	52	63	65
19	255	680	142	49	53	55	65	65
20	246	575	136	49	51	43	63	57
21	246	525	124	48	55	48	61	55
22	238	500	112	51	55	46	61	53
23	230	475	102	49	51	43	59	57
24	222	425	93	67	46	44	59	59
25	214	403	87	63	37	61	59	59
26	230	340	83	59	36	57	58	59
27	246	340	75	59	42	57	58	59
28	246	340	63	55	49	55	59	59
29	264	340	61	55	43	63	57	59
30	264	320	57	57	44	65	57	59
31		300		55	48		61	

NOTE.—Daily discharge computed from a rating curve well defined between discharges 37 and 830 second-feet (gage heights 4.3 and 8.5 feet). Discharge interpolated for days for which gage heights are missing. Discharge Jan. 1, 1912 to Apr. 4, 1912, and Nov. 25 to Dec. 31 estimated, because of ice, from climatologic records, discharge measurements, gage heights, and comparison with the flow at Montevideo, as follows: Jan. 1-31, 6 second-feet, varying from about 10 to 3 second-feet; Feb. 1-29, 5 second-feet, varying from about 2 to 10 second-feet; Mar. 1-27, 12 second-feet, varying from about 10 to 15 second-feet; Mar. 28 to Apr. 4, 200 second-feet, varying from about 20 to 300 second-feet; Dec. 1-31, 45 second-feet.

Monthly discharge of Chippewa River near Watson, Minn., for 1912.

[Drainage area, 1,940 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			6	0.0031	0.004	D.
February			5	.0026	.003	D.
March			20	.010	.01	D.
April	650		283	.146	.16	B.
May	1,720	273	865	.446	.51	A.
June	282	57	154	.079	.09	A
July	67	44	55.6	.029	.03	B.
August	57	36	49.5	.026	.03	B.
September	65	40	47.9	.025	.03	B.
October	67	57	61.5	.032	.04	B.
November	65		58.9	.030	.03	C.
December			45	.023	.03	C.
The year	1,720		138	.071	.97	

NOTE.—See footnotes to tables of daily gage height and daily discharge.

REDWOOD RIVER NEAR REDWOOD FALLS, MINN.

Location.—At the first highway bridge above Redwood Falls, 3 miles distant.

Records available.—July 2, 1909, to December 31, 1912.

Drainage area.—703 square miles.

Gage.—Chain gage attached to bridge—datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from the bridge except at low stages when they are made by wading at different sections.

Winter flow.—Ice exists from December to March, and discharge measurements are made to determine the winter flow.

Artificial control.—The flow at the gaging station is natural, as there are no dams above. Below the station a dam at Redwood Falls creates a pond extending for a considerable distance upstream but backwater does not reach the gaging station.

Discharge measurements of Redwood River near Redwood Falls, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 8[a]	C. J. Emerson	1.6	0.40	Aug. 29[c]	S. B. Soulé	1.72	5.4
Apr. 11	S. B. Soulé	2.20	57.7	29	do	[d]1.1	
Aug. 29[b]	do	1.72	6.1				

[a] Complete ice cover. Average thickness, 0.80 foot; average distance water surface to top of ice, 0.00 foot.
[b] Wading measurement, 1,000 feet above gage.
[c] Wading measurement, 1,100 feet above gage.
[d] Point of zero flow.

Daily gage height, in feet, of Redwood River near Redwood Falls, Minn., for 1912.

[Wallace Stuart, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		2.62	2.12	1.70	1.60	1.73	1.75	2.06
2		2.55	2.10	1.85	1.70	1.75	1.85	2.05
3		2.45	2.08	2.05	1.70	1.73	1.90	2.02
4		2.50	2.05	2.65	1.70	1.70	1.90	2.00
5		2.60	2.02	2.00	1.60	1.70	1.75	1.92
6		2.70	2.00	1.90	1.70	1.75	1.95	2.00
7		2.72	1.98	1.87	1.70	1.75	1.95	2.00
8		2.70	1.95	1.80	1.75	1.75	2.00	2.00
9		2.70	1.95	1.85	1.73	1.75	2.00	2.00
10		2.70	1.95	1.70	1.60	1.73	1.88	
11	2.20	2.52	1.90	1.80	1.65	1.75	2.00	1.95
12	2.20	2.45	2.00	1.80	1.65	1.75	2.10	2.00
13	2.25	2.30	1.95	1.77	1.65	1.73	2.10	2.00
14	2.20	2.20	2.00	1.70	1.65	1.73	2.00	1.96
15	2.20	2.25	2.08	1.65	1.55		1.85	1.90
16	1.98	2.30	2.05	1.75	1.75	1.70	1.95	2.00
17	2.20	2.35	2.05	1.73	1.75	1.75	1.95	1.96
18	2.25	2.30	2.00	1.73	1.75	1.80	2.00	1.96
19	2.22	2.30	1.95	1.75	1.85	1.75	2.10	1.95
20	2.20	2.22	1.95	1.63	1.70	1.70	1.96	1.90
21	2.28	2.50	1.95	1.80	1.80	1.73	2.00	1.98
22	2.22	2.50	1.92	1.75	1.80	1.75	2.05	2.00
23	2.25	2.40	1.90	1.80	1.80	1.78	2.05	2.00
24	2.25	2.35	1.88	1.75	1.80	1.75	2.05	1.98
25	2.45	2.20	1.88	1.60	1.70	1.85	1.90	1.90
26	2.45	2.25	1.85	1.77	1.80	1.85	1.96	1.98
27	2.40	2.20	1.85	1.80	1.75	1.85	2.05	1.95
28	2.55	2.15	1.82	1.80	1.73	1.85	2.00	1.98
29	2.55	2.10	1.82	1.77	1.73	1.83	2.05	2.00
30	2.60	2.15	1.80	1.67	1.77	1.85	1.96	1.88
31		2.12		1.70	1.77		2.00	

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 10, and about Dec. 1 to 31.

Daily discharge, in second-feet, of Redwood River near Redwood Falls, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		152	42	6	4	7.5	8.5	32
2		134	39	14	6	8.5	14	32
3		110	36	32	6	7.5	17	29
4		122	32	160	6	6	17	26
5		146	29	26	4	6	8.5	19
6		174	26	17	6	8.5	22	26
7		180	24	15	6	8.5	22	26
8		174	22	11	8.5	8.5	26	26
9		174	22	14	7.5	8.5	26	26
10		174	22	6	4	7.5	16	24
11	56	127	17	11	5	8.5	26	22
12	56	110	26	11	5	8.5	39	26
13	66	76	22	10	5	7.5	39	26
14	56	56	26	6	5	7.5	26	22
15	56	66	36	5	3.5	7	14	17
16	24	76	32	8.5	8.5	6	22	26
17	56	88	32	7.5	8.5	8.5	22	22
18	66	76	26	7.5	8.5	11	26	22
19	60	76	22	8.5	14	8.5	39	22
20	56	60	22	4.6	6	6	22	17
21	72	122	22	11	11	7.5	26	24
22	60	122	19	8.5	11	8.5	32	26
23	66	99	17	11	11	10	32	26
24	66	88	16	8.5	11	8.5	32	24
25	110	56	16	4	6	14	17	17
26	110	66	14	9.5	11	14	22	24
27	99	56	14	11	8.5	14	32	22
28	134	48	12	11	7.5	14	26	24
29	134	39	12	9.5	7.5	13	32	26
30	146	48	11	5.4	9.5	14	22	16
31		42		6	9.5		26	

NOTE.—Daily discharge computed from a fairly well-defined rating curve. Discharge Sept. 15 and Nov. 10 interpolated. Discharge Jan. 1 to Apr. 10 and Dec. 1 to 31 estimated, because of ice and absence of gage reader, from climatologic records, one discharge measurement, and discharge of adjacent drainage areas, as follows: Jan. 1-30, 1 second-foot; Feb. 1-29, 2 second-feet; Mar. 1-31, 10 second-feet; Apr. 1-10, 20 second-feet; Dec. 1-31, 10 second-feet.

Monthly discharge of Redwood River near Redwood Falls, Minn., for 1912.

[Drainage area, 703 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			1	0.0014	0.002	
February			2	.0028	.003	
March			10	.014	.02	
April	146		58.3	.083	.09	C.
May	180	39	101	.144	.17	B.
June	42	11	23.6	.034	.04	B.
July	160	4	15.4	.022	.03	B.
August	14	3.5	7.44	.011	.01	B.
September	14	6	9.12	.013	.01	B.
October	39	8.5	24.2	.034	.04	B.
November	32	16	23.9	.034	.04	C.
December			10.0	.014	.02	
The year	180		23.9	.034	.48	

NOTE.—See footnotes to table of daily discharge.

COTTONWOOD RIVER NEAR NEW ULM, MINN.

Location.—At Alwin highway bridge, 2 miles southeast of New Ulm, in sec. 31, T. 110 N., R. 30 W., 15 miles below the mouth of Sleepy Eye Creek, the nearest tributary.

Records available.—July 2, 1909, to December, 1912.

Drainage area.—1,190 square miles.

Gage.—Chain gage attached to bridge. On August 12, 1909, the datum of the gage was lowered 2.28 feet. All readings prior to that date have been corrected, so that all gage heights refer to the new datum.

Channel.—Slightly shifting, as shown by low-water measurements.

Discharge measurements.—Made from the bridge, except during extreme low water, when they are made by wading.

Winter flow.—Affected by ice.

Artificial control.—There are no dams above the gaging station, so that the flow of the river is natural at the station. Backwater from the dam of New Ulm does not extend to the gaging station.

Discharge measurements of Cottonwood River near New Ulm, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 6[a]	C. J. Emerson	2.09	22.3	June 19[d]	W. G. Hoyt	1.95	89.1
Feb. 8[b]	S. B. Soulé	2.70	13.5	Aug. 29[d]	S. B. Soulé	1.22	18.6
Mar. 19[c]	.....do	3.75	94.0	29[e]	.....do	1.22	20.5
Apr. 11	.....do	2.47	188	Dec. 27[f]	.....do	1.93	9.7

[a] Complete ice cover; average thickness of ice, 1.00 foot; average distance water surface to top of ice, 0.25 foot.

[b] Complete ice cover; average thickness of ice, 1.83 feet; average distance water surface to top of ice, 0.00 foot.

[c] Measuring section about 200 feet above gage. Complete ice cover; average thickness of ice, 1.46 feet; average distance water surface to top of ice, 0.09 foot.

[d] Wading measurement 60 feet below gage.

[e] Wading measurement 80 feet below gage.

[f] Complete ice cover; average thickness of ice, 0.67 foot.

Daily gage height, in feet, of Cottonwood River near New Ulm, Minn., for 1912.

[Ester Alwin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.3	2.55		4.8	2.5	1.75	1.30	1.15	1.28	1.20	1.25	
2				4.2	2.45	1.62	1.30	1.15	1.28	1.20	1.25	2.0
3				3.9	2.6	1.60	1.30	1.15	1.28	1.18	1.25	
4	2.15			3.75	2.7	1.60	1.30	1.15	1.28	1.12	1.25	
5		2.6		3.4	2.65	1.58	1.39	1.18	1.26	1.10	1.25	
6	2.1			3.25	2.3	1.56	1.42	1.18	1.25	1.12	1.25	
7				3.2	2.25	1.55	1.52	1.19	1.20	1.16	1.25	
8	2.15	2.75		2.9	2.2	1.65	1.55	1.20	1.20	1.18	1.25	
9				2.75	2.2	1.60	1.62	1.22	1.18	1.14	1.25	2.3
10				2.65	2.2	1.58	1.75	1.22	1.18	1.12	1.25	
11	2.2		3.65	2.45	2.15	1.45	1.75	1.15	1.18	1.12	1.25	
12		2.9		2.4	2.15	1.42	1.96	1.15	1.14	1.18	1.25	
13				2.4	2.1	1.40	1.65	1.14	1.10	1.26	1.25	
14			3.75	2.5	2.2	1.51	1.38	1.12	1.05	1.28	1.25	
15	2.35	2.9		2.55	2.2	1.80	1.36	1.12	1.05	1.29	1.25	
16				2.55	2.2	1.90	1.32	1.11	1.10	1.30	1.25	2.6
17				2.55	2.15	1.88	1.30	1.10	1.12	1.35	1.28	
18	2.4		3.9	2.65	2.2	1.85	1.25	1.29	1.18	1.35	1.28	
19			3.7	2.65	2.05	1.90	1.28	1.45	1.18	1.30	1.28	
20				2.65	2.0	2.0	1.35	1.58	1.15	1.28	1.28	
21			3.95	2.55	1.90	1.86	1.30	1.62	1.15	1.28	1.28	
22	2.4			2.55	1.85	1.65	1.30	1.60	1.12	1.28	1.28	
23				2.45	1.85	1.58	1.30	1.56	1.12	1.28	1.28	2.7
24				2.5	1.85	1.50	1.25	1.52	1.11	1.28	1.39	
25	2.4		4.0	2.55	1.85	1.50	1.24	1.50	1.10	1.26	1.48	
26				2.6	1.80	1.45	1.22	1.42	1.15	1.25	1.50	
27				2.65	1.78	1.38	1.20	1.35	1.18	1.25	1.50	1.93
28			4.15	2.85	1.88	1.38	1.20	1.30	1.18	1.25	1.48	
29	2.5			2.8	1.88	1.35	1.18	1.25	1.18	1.25	1.48	
30				2.7	1.86	1.30	1.18	1.28	1.19	1.25	1.48	2.8
31					1.85		1.16	1.28		1.25		

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 5 and about Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Cottonwood River near New Ulm, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	197	64	24	14	23	17	20
2	....	185	50	24	14	23	17	20
3	....	222	48	24	14	23	16	20
4	....	250	48	24	14	23	13	20
5	....	236	46	31	16	21	12	20
6	420	151	45	34	16	20	13	20
7	404	141	44	42	16	17	15	20
8	309	131	53	44	17	17	16	20
9	264	131	48	50	18	16	14	20
10	236	131	46	64	18	16	13	20
11	185	122	36	64	14	16	13	20
12	173	122	34	91	14	14	16	20
13	173	113	32	53	14	12	21	20
14	197	131	41	30	13	10	23	20
15	210	131	70	29	13	10	23	20
16	210	131	83	26	12	12	24	20
17	210	122	80	24	12	13	28	23
18	236	131	76	20	23	16	28	23
19	236	105	83	23	36	16	24	23
20	236	97	97	28	46	14	23	23
21	210	83	78	24	50	14	23	23
22	210	76	53	24	48	13	23	23
23	185	76	46	24	45	13	23	23
24	197	76	40	20	42	12	23	....
25	210	76	40	20	40	12	21	....
26	222	70	36	18	34	14	20	....
27	236	68	30	17	28	16	20	....
28	294	80	30	17	24	16	20	....
29	279	80	28	16	20	16	20	....
30	250	78	24	16	23	16	20	....
31	....	76	....	15	23	....	20	....

NOTE.—Daily discharge computed from a well-defined rating curve. Discharge Jan. 1 to Apr. 5 and Nov. 24 to Dec. 31 estimated, because of ice, from climatologic records discharge measurements, and gage heights, as follows: Jan. 1–31, 1912, 20 second-feet, varying from about 30 to 18 second-feet; Feb. 1–29, 15 second-feet, varying from about 18 to 13 second-feet; Mar. 1–31, 90 second feet; Apr. 1–5, 200 second-feet; Nov. 24–30, 23 second-feet; Dec. 1–31, 15 second-feet.

Monthly discharge of Cottonwood River near New Ulm, Minn., for 1912.

[Drainage area, 864 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	20	0.023	0.03	D.
February	....	....	15	.017	.02	D.
March	....	....	90	.104	.12	C.
April	....	....	233	.270	.30	C.
May	250	68	123	.142	.16	B.
June	97	24	51.0	.059	.07	B.
July	91	15	31.0	.036	.04	B.
August	50	12	23.6	.027	.03	C.
September	23	10	15.8	.018	.02	C.
October	28	12	19.4	.022	.03	C.
November	....	....	21.4	.025	.03	C.
December	....	....	15	.017	.02	C.
The year	250	....	54.8	.063	.87	

NOTE.—See footnotes to tables of daily gage height and daily discharge.

ST. CROIX RIVER NEAR ST. CROIX FALLS, WIS.

Location.—At the power plant of the Minneapolis General Electric Co. on the Wisconsin side of St. Croix River near St. Croix Falls, Wis., about 50 miles above the confluence of St. Croix and Mississippi rivers near Hastings, Minn. Apple River, draining an area wholly in Wisconsin, enters from the left about 2 miles below the station; Snake River enters from the right about 35 miles above the station.

Records available.—January 10, 1902, to June 30, 1905; January 1, 1910, to December 31, 1912. Data for 1903 published in Water-Supply Paper 98, pp. 176–177, under "St. Croix near Taylors Falls, Minn." Daily and monthly discharge January 10, 1902, to June 30, 1905, and January 1, 1910, to October 31, 1912, published also in the report on "Water resources of Minnesota" by the State Drainage Commission.

Drainage area.—5,930 square miles.

Discharge.—Discharge determined from kilowatt output of dynamo and exciters plus the flow over the dam and spillway, considered as a weir.

Cooperation.—Records furnished by the Minneapolis General Electric Co.

Daily discharge, in second-feet, of St. Croix River near St. Croix Falls., Wis., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,470	1,420	1,670	4,790	8,560	8,510	2,260	1,210	1,030	1,830	1,790	1,610
2	2,190	1,110	1,720	5,960	6,890	7,500	1,640	1,940	1,410	1,760	1,920	1,540
3	2,040	1,660	920	6,090	7,050	7,370	1,550	1,790	1,770	1,600	1,510	1,350
4	2,070	1,110	1,820	5,670	10,800	6,880	989	922	2,110	1,780	1,630	1,940
5	1,660	1,460	1,120	8,350	18,900	5,400	1,700	866	2,530	1,960	1,520	1,920
6	1,650	1,260	1,310	9,670	33,500	4,590	1,580	1,710	2,750	1,580	1,780	1,740
7	1,230	1,420	1,370	8,470	28,700	4,100	866	1,700	2,830	1,340	1,630	1,360
8	1,510	1,510	1,670	6,590	24,300	4,340	1,910	1,170	1,900	2,360	1,740	1,070
9	1,620	1,430	1,700	8,040	19,100	4,170	1,820	1,500	1,980	2,060	1,750	1,360
10	1,570	1,580	930	7,420	14,200	4,580	3,830	2,010	2,310	1,740	1,590	1,190
11	1,580	1,180	1,680	4,170	11,400	2,700	2,850	928	4,450	1,750	1,770	1,260
12	1,320	2,000	1,350	5,140	9,830	2,530	1,380	1,880	2,140	1,960	1,600	1,240
13	1,730	1,160	1,220	5,400	8,740	2,570	1,380	2,140	2,280	1,690	1,590	1,230
14	1,280	1,280	1,480	5,340	7,230	2,440	822	2,080	2,120	2,020	1,660	1,430
15	1,010	1,420	1,750	5,780	9,540	2,230	5,160	2,010	1,300	2,090	1,560	1,650
16	1,290	1,460	1,710	5,890	8,330	2,540	2,090	1,760	2,240	2,100	1,740	1,440
17	940	1,750	900	8,260	7,920	3,230	1,720	1,640	2,390	2,090	1,340	1,680
18	1,280	950	1,650	6,420	4,950	3,940	1,670	1,120	2,120	2,060	1,640	1,530
19	1,410	1,860	1,390	7,280	4,040	3,480	1,680	2,170	1,800	2,000	1,560	1,410
20	1,620	1,240	1,420	6,430	4,520	2,300	1,560	2,430	1,900	1,840	1,630	1,610
21	1,120	1,310	1,980	6,070	4,610	2,270	899	2,510	2,010	1,900	1,630	1,790
22	1,440	1,570	1,960	5,480	4,510	2,500	1,940	2,380	1,410	1,720	1,630	1,440
23	1,380	1,470	1,970	5,560	4,760	1,550	1,620	2,080	1,910	1,830	1,720	1,350
24	1,430	1,830	710	5,240	4,870	2,140	1,690	1,690	1,800	1,750	1,460	1,850
25	1,430	970	1,890	5,610	5,220	2,330	1,620	937	1,960	1,840	1,520	1,220
26	1,420	1,980	1,490	5,990	4,330	2,360	1,770	1,820	1,820	2,080	876	1,790
27	1,510	1,520	1,860	9,590	5,130	2,620	1,640	1,910	2,000	1,580	1,190	1,500
28	1,170	1,490	1,950	11,300	5,510	2,650	823	1,860	1,990	1,700	1,300	1,690
29	1,810	1,570	1,910	10,500	5,550	2,450	1,530	1,940	1,300	1,800	949	1,480
30	1,550	....	1,830	8,910	4,960	1,470	1,900	2,000	2,140	1,760	1,350	1,450
31	1,430	....	1,460	....	5,270	....	1,820	1,930	....	1,710	....	1,100

Monthly discharge of St. Croix River near St. Croix Falls, Wis., for 1912.

[Drainage area, 5,930 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,190	940	1,490	0.251	0.29
February	2,000	950	1,450	.245	.26
March	1,970	710	1,540	.260	.30
April	11,300	4,170	6,850	1.16	1.29
May	33,500	4,040	9,780	1.65	1.90
June	8,510	1,470	3,590	.605	.68
July	5,160	822	1,800	.304	.35
August	2,510	866	1,740	.293	.34
September	4,450	1,030	2,060	.347	.39
October	2,360	1,340	1,850	.312	.36
November	1,920	876	1,550	.261	.29
December	1,940	1,070	1,490	.251	.29
The year	33,500	710	2,930	.494	6.74

NOTE.—Computed by engineers of the United States Geological Survey from records of daily discharge furnished by the Minneapolis General Electrical Co.

KETTLE RIVER NEAR SANDSTONE, MINN.

Location.—At the quarries of the Barber Asphalt Co. at Benning, 3 miles above Sandstone; no tributaries within several miles.

Records available.—October 18, 1908, to December 31, 1912.

Drainage area.—825 square miles.

Gage.—Staff gage in two sections, fastened to vertical rock walls. Gage datum subsequent to April 25, 1912, may differ not more than about 0.02 foot from datum of previous years.

Channel.—Permanent; bedrock.

Artificial control.—The nearest dam is at Sandstone, 3 miles below, but the station is above its influence.

Winter flow.—The gage is 50 feet above decided rapids which remain open except during periods of extremely cold weather, when they freeze and cause backwater. During January, 1912, backwater existed at the gage ranging from half a foot to 1.2 feet.

Accuracy.—The rating curve used for 1911 has been revised above gage height 3.0 feet on the basis of measurements made by the Geological Survey. The curve used below 3.0 feet is one furnished by the Kettle River Co. Below gage height 1.2 feet the rating curve is an extension and discharge values obtained from it below that point should be used with caution as they may be 100 per cent in error at gage height 0.7 foot.

Cooperation.—Station maintained in cooperation with the Kettle River Co.

Discharge measurements of Kettle River near Sandstone, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 11[a]	S. B. Soulé	2.58	131	May 16[b]	S. B. Soulé	4.02	1,730
Apr. 25[b]	.....do	3.20	915	16[b]	.....do	3.99	1,680
May 10[b]	.....do	5.35	3,140				

[a] Complete ice cover section about 600 feet below gage.

[b] Measurement made from highway bridge about 5,000 feet above gage.

Daily gage height, in feet, of Kettle River near Sandstone, Minn., for 1912.

[D. R. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2.8	1.9	2.2	2.35	5.6	3.3	1.6	1.4	1.9	1.35	1.3
2	2.8	1.9	2.2	2.4	5.6	3.25	1.55	1.35	1.85	1.3	1.3
3	2.8	1.9	2.15	2.75	5.7	3.3	1.5	1.35	1.75	1.25	1.3
4	2.8	1.9	2.0	3.2	6.4	3.2	1.5	1.35	1.65	1.2	1.3
5	2.7	1.95	1.6	3.6	7.2	3.1	1.65	1.3	1.6	1.3	1.3
6	2.6	1.95	1.4	3.6	7.5	3.1	1.7	1.65	1.6	1.3	1.3
7	2.7	2.0	1.3	3.7	7.6	2.9	1.65	1.7	1.6	1.35	1.3
8	2.6	2.0	1.1	4.0	6.6	2.85	1.7	1.6	1.55	1.3	1.3
9	2.55	2.1	1.1	3.8	6.1	2.7	1.75	1.6	1.55	1.25	1.3
10	2.6	2.1	1.1	3.6	5.3	2.6	1.7	1.5	1.5	1.2	1.3
11	2.58	2.0	1.0	3.6	5.1	2.4	1.65	1.45	1.45	1.25	1.3
12	2.5	2.0	1.1	3.4	5.0	2.35	1.6	1.4	1.45	1.5	1.3
13	2.5	1.9	1.1	3.2	4.8	2.2	1.65	1.4	1.45	1.45	1.3
14	2.45	1.9	1.15	3.1	4.7	2.3	1.6	1.35	1.4	1.4	1.3
15	2.4	2.0	1.15	3.1	4.3	2.4	1.5	1.35	1.4	1.4	1.3
16	2.4	2.1	1.1	3.0	4.0	3.0	1.45	1.4	1.4	1.35	1.3
17	2.3	2.1	1.1	3.1	3.7	2.85	1.4	1.4	1.45	1.35	1.25
18	2.3	2.0	1.15	3.5	3.6	2.8	1.4	1.45	1.45	1.35	1.2
19	2.2	2.0	1.0	3.8	3.6	2.7	1.45	1.5	1.4	1.35	1.2
20	2.2	2.0	1.0	3.8	3.4	2.7	1.5	1.45	1.35	1.35	1.15
21	2.2	2.1	1.05	3.7	3.6	2.5	1.5	1.4	1.35	1.35	1.1
22	2.2	2.1	1.1	3.8	4.2	2.3	1.55	1.35	1.35	1.35	1.05
23	2.1	2.3	1.15	3.7	4.0	2.25	1.5	1.35	1.3	1.3	1.0
24	2.15	2.3	1.1	3.6	3.9	2.1	1.6	1.3	1.35	1.3	1.0
25	2.1	2.35	1.2	3.2	3.8	1.9	1.5	1.3	1.4	1.3	.95
26	2.0	2.35	1.2	4.6	3.7	1.85	1.5	1.35	1.5	1.25	.9
27	2.1	2.3	1.4	5.5	3.7	1.8	1.45	1.3	1.45	1.3	.8
28	2.1	2.3	1.65	5.8	3.6	1.7	1.45	1.6	1.4	1.3	.8
29	2.1	2.25	1.7	5.2	3.4	1.6	1.4	1.65	1.3	1.3	.75
30	2.0	....	1.8	5.1	3.4	1.6	1.4	1.7	1.3	1.3	.7
31	2.0	....	2.0	....	3.3	....	1.45	1.9	....	1.3	....

NOTE.—Gage heights Jan. 3 to Apr. 25, may be in error from 0.05 to 0.1 foot as a result of damage to gage. Gage datum subsequent to Apr. 25 may differ not more than about 0.02 foot from datum of previous years. Gage not read during December as a result of a misunderstanding.

Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 7 and about Dec. 1 to 31.

Daily discharge, in second-feet, of Kettle River near Sandstone, Minn., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	490	3,440	1,090	186	136	288	124	112
2	....	515	3,440	1,050	173	124	269	112	112
3	....	705	3,560	1,090	160	124	233	101	112
4	....	1,010	4,390	1,010	160	124	201	90	112
5	....	1,340	5,390	935	201	112	186	112	112
6	....	1,340	5,770	935	216	201	186	112	112
7	....	1,430	5,900	800	201	216	186	124	112
8	70	1,700	4,640	768	216	186	173	112	112
9	70	1,520	4,030	675	233	186	173	101	112
10	70	1,340	3,100	620	216	160	160	90	112
11	59	1,340	2,860	515	201	148	148	101	112
12	70	1,170	2,750	490	186	136	148	160	112
13	70	1,010	2,530	420	201	136	148	148	112
14	80	935	2,420	465	186	124	136	136	112
15	80	935	1,990	515	160	124	136	136	112
16	70	865	1,700	865	148	136	136	124	112
17	70	935	1,430	768	136	136	148	124	101
18	80	1,260	1,340	735	136	148	148	124	90
19	52	1,520	1,340	675	148	160	136	124	90
20	52	1,520	1,170	675	160	148	124	124	80

Daily discharge, in second-feet, of Kettle River near Sandstone, Minn., for 1912—Contd.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21	61	1,430	1,340	565	160	136	124	124	70
22	70	1,520	1,890	465	173	124	124	124	61
23	80	1,430	1,700	442	160	124	112	112	52
24	70	1,340	1,610	375	186	112	124	112	52
25	90	1,010	1,520	288	160	112	136	112	44
26	90	2,310	1,430	269	160	124	160	101	37
27	136	3,320	1,430	250	148	112	148	112	24
28	201	3,670	1,340	216	148	186	136	112	24
29	216	2,980	1,170	186	136	201	112	112	18
30	250	2,860	1,170	186	136	216	112	112	[a] 12
31	330	....	1,090	....	148	288	....	112	....

[a] May be 100 per cent in error.

NOTE.—Daily discharge computed from a rating curve well defined between discharges 90 and 3,320 second-feet (gage heights 1.2 and 5.5 feet). Below discharge 90 second-feet (gage height 1.2 feet) and above discharge 3,320 second-feet (gage height 5.5 feet) the rating curve is an extension. Rating curve for stages below 3 feet based on measurements made by the Kettle River Co. Discharge Jan. 1, 1912, to Mar. 7, 1912, and Dec. 1-31 estimated, because of ice, from climatologic records and discharge of adjacent areas especially those of the Rum and the Snake, discharge measurements and gage heights, as follows: Jan. 1-30, 130 second-feet, varying from about 200 to 100 second-feet; Feb. 1-29, 90 second-feet, varying from about 100 to 80 second-feet; Mar. 1-7, 75 second-feet, varying from about 80 to 70 second-feet; Dec. 1-31, 80 second-feet.

Monthly discharge of Kettle River near Sandstone, Minn., for 1912.

[Drainage area, 825 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	130	0.158	0.18	C.
February	....	....	90	.109	.12	C.
March	330	....	96.9	.117	.13	B.
April	3,670	490	1,490	1.81	2.02	B.
May	5,900	1,090	2,540	3.08	3.55	A.
June	1,090	186	611	.741	.83	A.
July	233	136	172	.208	.24	A.
August	288	112	152	.184	.21	A.
September	288	112	158	.192	.21	A.
October	160	90	117	.142	.16	B.
November	112	[a] 12	84.9	.103	.11	C.
December	....	....	80	.097	.11	D.
The year	5,900	....	478	.579	7.87	

[a] May be 100 per cent in error.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

SNAKE RIVER AT MORA, MINN.

Location.—At the highway bridge, three-fourths of a mile south of Mora, in sec. 14, T. 39 N., R. 24 W., below the mouth of Ann River.

Records available.—June 11, 1909, to December 31, 1912.

Drainage area.—422 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Measurements prior to 1912 showed channel to be practically permanent. During high water of May, 1912, channel shifted badly and was gradually changing throughout the remainder of the year.

Winter flow.—From December to March measurements are made through the ice to determine approximately the winter discharge.

Artificial control.—The flow of the river at the gaging station is unregulated except for a possible slight effect caused by logging dams at Knife Lake outlet and

White Pine. Below Pine City the flow is regulated to some extent by the operation of the power plant at Pine City.

Accuracy.—Owing to shifting channel records can not be considered better than fair.

Discharge measurements of Snake River at Mora, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 10[a]	S. B. Soulé	6.63	31.2	June 25[e]	W. G. Hoyt	6.78	112
Feb. 22[b]	do	6.82	38.2	Aug. 13[e]	S. B. Soulé	6.31	69
Mar. 26[c]	do	6.83	29.6	13[e]	do	6.30	64
Apr. 3[d]	C. J. Emerson	7.97	224	Oct. 24[f]	do	5.94	33
May 10	S. B. Soulé	12.38	1,950	24[g]	do	5.94	36
14	do	9.76	899	Dec. 31[h]	do	6.41	31
15	do	9.53	868				

[a] Complete ice cover; average thickness, 1.14 feet; average distance water surface to top of ice, 0.16 foot.
[b] Complete ice cover; average thickness of ice, 1.59 feet; average distance water surface to top of ice, 0.19 foot.
[c] Complete ice cover; average thickness of ice, 1.22 feet; average distance water surface to top of ice, 0.07 foot.
[d] Floating ice and undoubtedly back water from ice jam.
[e] Wading measurement about 200 feet above gage.
[f] Wading measurement about 500 feet above gage.
[g] Wading measurement about 700 feet above gage.
[h] Complete ice cover at control. Wading measurement about 700 feet above gage.

Daily gage height, in feet, of Snake River at Mora, Minn., for 1912.

[Alice Lasher, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.7			8.0	9.4	7.8	6.31	6.00	6.65	6.05	5.92	5.95
2				8.1	8.9	7.7	6.35	6.00	6.75	6.00	5.95	
3				7.9	10.6	7.8	6.32	6.00	6.70	6.00	5.92	
4	6.7		6.75	7.5		7.8	6.40	6.00	6.60	6.00	5.92	
5				7.5		7.8	6.42	6.00	6.60	5.95	5.95	5.95
6				7.7	16.7	7.5	6.34	6.09	6.40	5.90	5.94	
7				7.9		7.35	6.35	6.11	6.30	5.91	5.92	
8	6.65		6.7	7.8		7.2	6.41	6.13	6.20	5.90	5.92	
9				7.6	12.6	7.1	6.42	6.32	6.18	5.91	5.92	
10				7.5	12.2	7.05	6.36	6.35	6.10	5.92	5.92	
11	6.65		6.7	7.4	11.4	7.0	6.29	6.30	6.08	5.90	5.92	
12				7.3	10.6	6.95	6.25	6.31	6.00	6.10	5.92	6.1
13				7.3	10.2	6.9	6.32	6.31	6.00	6.05	5.92	
14			6.7	8.6	9.8	6.9	6.26	6.21	6.00	6.00	5.90	
15	6.65			9.2	9.5	6.9	6.24	6.16	5.95	6.00	5.92	
16				9.4	9.3	7.6	6.20	6.10	5.95	6.00	5.95	
17				9.6	9.0	8.2	6.20	6.16	5.96	6.00	5.88	
18			6.8	10.0	8.8	8.1	6.14	6.16	6.00	6.00	5.90	
19				10.6	8.6	7.8	6.10	6.11	6.00	6.00	5.90	
20				10.0	8.5	7.5	6.10	6.10	5.98	5.98	5.90	6.5
21			6.7	9.4	8.4	7.3	6.10	6.06	5.95	5.95	5.91	
22		6.8		9.5	8.5	7.2	6.10	6.04	5.95	6.00	5.90	
23				9.8	8.8	7.0	6.48	6.00	5.95	6.00	5.90	
24				8.6	9.0	6.9	6.29	6.00	5.94	5.95	6.08	
25			6.8	8.8	8.8	6.8	6.18	6.00	6.00	5.95	6.00	
26		6.8		10.0	8.5	6.7	6.11	6.00	6.00	5.95	6.00	6.48
27				11.3	8.4	6.6	6.10	6.00	5.98	5.95		
28			7.2	11.1	8.4	6.55	6.04	5.95	5.95	5.95		
29		6.8		10.5	8.2	6.5	6.06	6.00	6.00	5.94		
30	6.85		7.4	9.9	8.1	6.4	6.05	6.30	6.08	5.91		
31					7.9		6.04	6.25		5.91		6.41

NOTE.—May 4 to 8, water over top of gage. Gage height May 6 determined on June 26 by wye levels to a point indicated by the observer as the crest height reached by the flood. Relation of gage height to discharge affected by ice Jan. 1 to about Apr. 12, and about Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Snake River at Mora, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		990	320	52	36	110	43	34
2		815	295	56	36	125	40	36
3		1,450	320	53	36	118	40	34
4		2,700	320	60	36	113	40	34
5		3,100	320	62	36	113	36	36
6		3,600	245	59	46	77	33	35
7		3,200	211	60	48	66	34	34
8		2,800	179	67	49	56	33	34
9		2,030	160	68	68	54	34	34
10		1,870	151	61	71	47	34	34
11		1,550	142	55	66	45	38	34
12		1,230	134	51	67	40	47	34
13	320	1,080	125	57	67	40	43	34
14	710	938	125	52	56	40	40	33
15	920	850	125	50	52	36	40	34
16	990	780	270	47	47	36	40	36
17	1,060	675	430	47	52	37	40	32
18	1,210	610	400	42	52	40	40	33
19	1,450	550	320	40	48	40	40	33
20	1,210	520	245	40	47	38	38	33
21	990	490	200	40	44	36	36	34
22	1,020	520	179	40	42	36	40	33
23	1,130	610	142	75	40	36	40	33
24	710	675	125	59	40	35	36	
25	780	610	110	49	40	40	36	
26	1,210	520	96	44	40	40	36	
27	1,730	490	83	43	40	38	36	
28	1,650	490	77	39	36	36	36	
29	1,410	430	71	40	40	40	35	
30	1,170	400	60	40	66	45	34	
31		345		39	60		34	

NOTE.—Daily discharge May 4 to 8, estimated from crest height and observer's notes. Daily discharge computed from a fairly well defined rating curve. Discharge Jan. 1, to Apr. 12 and Nov. 24 to Dec. 31 estimated, because of ice, from climatologic records, discharge measurements, and gage heights, as follows: Jan. 1–31, 30 second-feet, varying from about 40 to 20 second-feet; Feb. 1–29, 35 second-feet, varying from about 20 to 40 second-feet; Mar. 1–31, 40 second-feet, varying from about 40 to 50 second-feet; Apr. 1–12, 250 second-feet, varying from about 230 to 300 second-feet; Nov. 24–30, 33 second-feet; Dec. 1–31, 32 second-feet.

Monthly discharge of Snake River at Mora, Minn., for 1912.

[Drainage area, 422 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			30	0.071	0.08	C.
February			35	.083	.09	C.
March			40	.095	.11	C.
April	1,730		756	1.79	2.00	B.
May	3,600	345	1,190	2.82	3.25	B.
June	430	60	199	.472	.53	A.
July	75	39	51.2	.121	.14	B.
August	71	36	48.5	.115	.13	B.
September	125	35	55.1	.131	.15	A.
October	47	33	37.6	.089	.10	B.
November			33.7	.080	.09	B.
December			32	.076	.09	C.
The year	3,600		209	.495	6.76	

NOTE.—See footnotes to table of daily discharge.

CANNON RIVER AT WELCH, MINN.

Location.—At highway bridge at Welch, just below a very small tributary and 3 miles above the mouth of Belle Creek.

Records available.—June 7, 1909, to December 31, 1912.

Drainage area.—1,290 square miles.

Gage.—Chain, attached to bridge; datum unchanged.

Channel.—Practically permanent.

Winter flow.—Ice is present from December to March, during which period measurements are made to determine the winter discharge.

Artificial control.—The flow at the gaging station is regulated to a greater or less extent at each of the 11 developed power plants above. The flow is also regulated by a dam at the outlet of Cannon Lake.

Maximum flow.—In April, 1888, the high water reached the eaves of the wheelhouse at the mill, 20.1 feet above the datum of the present gage. It is said that this high water was not caused by ice gorging.

Accuracy.—The angle which the current makes at the gaging station necessitates a correction, and, owing to the daily fluctuation of the river during low stage caused by artificial control, the records of flow can not be considered better than fair. On July 31, 1912, it was found by wye levels that the bridge, at the place were the gage is fastened, had settled 0.48 foot. Change has been considered gradual, but because of uncertainty the accuracy ratings in table of monthly discharge, January to July, are low.

Discharge measurements of Cannon River at Welch, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 5[a]	Hoyt and Soulé	[b]6.90	318	Apr. 8	W. G. Hoyt	[c]7.84	1,250
20[a]	S. B. Soulé	[b]6.81	307	July 31	S. B. Soulé	5.61	212
Mar. 23	C. J. Emerson	[c]6.62	585	Oct. 23	W. G. Hoyt	5.66	217
23	.....do	[c]6.58	531				

[a] Measurement made under complete ice cover.
[b] Originally observed gage height reduced by 0.10 foot. See "Accuracy."
[c] Originally observed gage height reduced by 0.22 foot. See "Accuracy."

Daily gage height, in feet, of Cannon River at Welch, Minn., for 1912.

[Esther J. Norell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		6.7		9.3	7,2	5.95	5.46	5.65	5.55	5.40	5.48	5.40
2				8.8	7.1	5.85	5.36	6.32	5.7	5.44	5.65	5.5
3				8.5	7.1	5.95	5.55	5.18	5.65	5.44	5.49	5.6
4	6.1		[a]6.9	8.1	7.2	5.85	5.31	5.15	5.7	5.52	5.31	5.7
5		6.8		7.6	7.2	6.35	5.65	5.5	5.65	5.85	5.5	5.6
6				7.7	6.9	6.45	6.05	5.6	5.65	5.01	5.5	5.5
7			[a]7.0	7.9	6.55	6.25	5.9	5.6	5.6	5.09	5.5	5.7
8	6.6	6.8		7.8	6.45	6.15	5.75	5.18	5.38	5.5	5.48	5.25
9				7.8	6.35	6.0	5.65	5.12	5.6	5.38	5.55	5.40
10				7.9	6.45	5.95	5.65	5.5	5.65	5.35	5.88	5.65
11	6.4		[a]6.9	7.7	6.8	5.75	5.6	5.45	5.6	5.5	5.6	5.8
12		6.9		7.7	6.5	5.65	5.8	5.55	5.6	5.7	5.6	5.75
13				7.5	6.25	5.75	5.9	5.6	5.6	5.48	5.65	5.5
14				7.6	5.65	5.7	6.2	5.7	5.65	5.40	5.5	5.65
15	6.45		[a]5.7	8.0	6.0	5.8	6.05	5.7	5.42	5.7	5.65	5.30

[a] Gage height to top of ice.

Daily gage height, in feet, of Cannon River at Welch, Minn., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16				8.0	6.0	5.9	5.95	5.7	5.22	5.5	5.6	5.7
17				7.6	6.2	5.75	6.05	5.6	5.55	5.40	5.30	5.65
18	6.65		7.3	7.4	6.1	5.65	6.05	5.42	5.45	5.39	5.28	5.55
19				7.2	5.65	5.65	5.9	5.35	5.41	5.41	5.6	5.6
20		6.8	8.0	7.0	6.3	5.65	5.9	5.55	5.41	5.28	5.6	5.6
21			7.3	7.3	7.2	5.75	5.85	5.31	5.48	5.5	5.65	5.5
22	6.65	[a]6.95	6.85	8.8	7.5	5.43	5.9	5.65	5.22	5.55	5.42	5.5
23			6.75	9.4	7.3	5.03	5.9	5.65	5.25	5.55	5.38	5.45
24			6.75	9.0	7.1	5.33	5.9	5.9	5.65	5.38	5.48	5.5
25	6.65		6.75	8.4	7.0	5.65	5.8	5.9	5.36	5.41	5.5	5.20
26		[a]7.05,	6.95	8.4	6.9	5.48	5.7	5.48	5.41	5.41	5.6	5.30
27			7.6	8.0	6.9	5.33	5.75	5.8	5.37	5.30	5.65	5.55
28			8.6	7.8	6.3	5.13	5.75	5.6	5.6	5.5	5.7	5.5
29	6.65	[a]6.8	9.0	7.3	6.2	5.28	5.75	5.32	5.21	5.44	5.35	5.25
30			9.2	7.2	6.1	5.18	5.65	5.08	5.06	5.48	5.6	5.20
31			9.5		6.0		5.6	5.25		5.5		5.40

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 17; probably little if any backwater from ice during December.

Daily discharge, in second-feet, of Cannon River at Welch, Minn., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		2,230	851	306	161	209	182	147	165
2		1,850	800	271	139	446	223	156	209
3		1,630	800	306	182	104	209	156	168
4		1,370	851	271	128	90	223	175	128
5		1,070	851	458	209	170	209	271	170
6		1,120	701	499	342	195	209	78	170
7		1,240	542	418	288	195	195	90	170
8		1,180	499	380	238	104	143	170	165
9		1,180	458	324	209	94	195	143	182
10		1,240	499	306	209	170	209	136	143
11		1,120	654	238	195	158	195	170	195
12		1,120	520	209	254	182	195	223	195
13		1,010	418	238	288	195	195	165	209
14		1,070	209	223	399	223	209	147	170
15		1,300	324	254	342	223	152	223	209
16		1,300	324	288	306	223	111	170	195
17		1,070	399	238	342	195	182	147	126
18	903	956	361	209	342	152	158	145	122
19	1,100	851	209	209	288	136	149	149	195
20	1,300	750	438	209	288	182	149	122	195
21	903	903	851	238	271	128	165	170	209
22	678	1,850	1,110	154	288	209	111	182	152
23	631	2,310	903	81	288	209	116	182	143
24	631	2,000	800	132	288	288	209	143	165
25	631	1,560	750	209	254	288	139	149	170
26	726	1,560	701	165	223	165	149	149	195
27	1,070	1,300	701	132	238	254	141	126	209
28	1,700	1,180	438	96	238	195	195	170	223
29	2,000	903	399	122	238	130	109	156	136
30	2,160	851	361	104	209	88	85	165	195
31	2,390		324		195	116		170	

NOTE.—Daily discharge computed from a rating table well defined. Mar. 19, discharge interpolated. Discharge Jan. 1 to Mar. 17 and Dec. 1 to 31, estimated, because of ice, from discharge measurements, observer's records, climatologic records, and the discharge of Zumbro River, as follows: Jan. 1-31, 275 second-feet, varying from about 250 to 300 second-feet; Feb. 1-29, 310 second-feet, varying from about 300 to 320 second-feet; Mar. 1-17, 320 second-feet, varying from about 310 to 330 second-feet; Dec. 1-31, 170 second-feet, varying from about 100 to 250 second-feet.

Monthly discharge of Cannon River at Welch, Minn., for 1912.

[Drainage area, 1,290 square miles.[a]]

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January			275	D.
February			310	C.
March	2,390		718	C.
April	2,310	750	1,300	C.
May	1,010	209	579	C.
June	499	81	243	D.
July	399	128	254	C.
August	446	88	185	B.
September	223	85	170	C.
October	271	78	160	B.
November	223	122	176	B.
December			170	C.
The year	2,390		378	

[a] Discharge in "second-feet per square mile" and "run-off (depth in inches)" not published for this drainage area because of artificial control. See station description.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

CHIPPEWA RIVER AT CHIPPEWA FALLS, WIS.

Location.—At the highway bridge at Chippewa Falls, Wis., 2,500 feet below the mouth of Duncan Creek.

Records available.—April, 1899, to December 31, 1912. The gage was originally established by the Chippewa Lumber & Boom Co., which has kept a continuous record since 1899. Since 1904 the United States Weather Bureau has obtained gage heights during the flood season of each year. On June 1, 1906, the United States Geological Survey began making discharge measurements and obtained gage heights when no record was obtained by the Weather Bureau. The gage heights as published have been obtained from the following sources: United States Weather Bureau, March to September, 1905, 1907, 1908; April to July, 1909; Chippewa Lumber & Boom Co., October 1 to December 31, 1911; United States Geological Survey. Gage read from January to June 1912 by Chippewa Lumber & Boom Co.; March to July, 1912, by U. S. Weather Bureau; December, 1912, by Chippewa Valley Railway, Light & Power Co. For the period March to June when there were two individual readings, the mean has been used.

Drainage area.—5,300 square miles.

Gage.—Staff, painted on one of the cylindrical piers at right end of bridge; graduated to feet and inches, but readings published to feet and hundredths; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—Maximum stage, according to United States Weather Bureau, was 13.5 feet September 16 and 17, 1903.

Winter flow.—Ice forms about 2 feet in thickness and the winter flow is considerably modified by backwater caused by ice below the section. On account of the swift water and the proximity of the dam there is considerable open water at the gage.

Artificial control.—When the electric light plant and sawmill above the gage are in operation, diurnal fluctuation is caused at the gage. These fluctuations modify the flow markedly at times. The operation of small storage reservoirs at the headwaters also modifies the flow past the station.

Accuracy.—The accuracy is affected to a greater or less extent by the operation of the logging reservoirs and power plants and during the winter by ice, but the channel appears to be permanent, and an excellent rating curve has been developed from discharge measurements made during 1906–1909. As the station has not been visited since February 15, 1909, estimates of discharge are withheld until the discharge rating curve and the permanency of the gage are checked by additional measurements.

Cooperation.—Gage heights during 1912 have been furnished through the courtesy of the Chippewa Lumber & Boom Co., United States Weather Bureau, and Chippewa Valley Railway, Light & Power Co.

Daily gage height, in feet, of Chippewa River at Chippewa Falls., Wis., for 1912.

[G. W. Rand, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Dec.
1			1.5	2.2	4.8	4.3	1.2	
2			1.5	2.3	4.3	4.0	1.0	
3		1.6	1.5	2.7	4.0	3.8	1.0	
4			1.5	2.7	4.5	3.2	1.4	
5			1.5	3.7	7.2	3.2	1.2	
6	2.2		1.5	5.2	9.4	3.0	1.0	
7			1.5	6.3	9.4	2.8	1.0	
8			1.5	7.7	8.1	2.6	1.0	
9			1.5	7.4	7.0	2.6	1.0	
10		1.5	1.5	6.3	5.8	2.2	1.2	
11			1.5	5.5	5.0	2.0	1.0	
12			1.5	5.0	4.2	1.8	1.0	
13	2.0		1.6	4.8	3.9	1.65	1.3	
14			1.5	4.7	3.4	1.7	1.2	
15			1.5	4.9	3.1	1.8	1.2	
16			1.5	5.1	3.0	1.7	1.0	1.5
17		1.5	1.5	5.5	2.8	1.85	1.0	
18			1.7	4.7	3.0	1.9	.9	
19			1.7	4.7	2.7	2.3	.9	
20	1.8		1.7	4.2	2.8	2.2	.9	1.5
21			1.7	3.7	2.7	2.2	.7	
22			1.8	4.8	2.8	2.0	.7	
23			1.7	6.2	8.0	1.8	.7	1.5
24		1.6	1.8	6.0	9.1	1.8	1.2	
25			1.8	5.0	7.2	1.8	1.8	
26			1.8	5.0	5.6	1.6	4.8	
27	1.65		2.0	5.4	4.7	1.45	3.7	1.5
28			1.8	6.0	7.2	1.35	2.7	
29			2.0	6.2	8.0	1.25	2.3	
30			2.0	5.5	7.2	1.0	1.7	1.5
31			2.2		6.0		1.5	

NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to Apr. 3 and about Dec. 16 to 31.

RED CEDAR RIVER AT CEDAR FALLS, WIS.

Location.—At the highway bridge at the outskirts of Cedar Falls, Wis., 4½ miles above the crossing of the Chicago, St. Paul, Minneapolis & Omaha Railway.

Records available.—April 1, 1909, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff fastened to bridge pier; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—No discharge measurements have been made, and the station has not been visited since the gage was established.

Winter flow.—Winters are severe in this locality, but the gage heights at the section do not appear to be much affected by ice, probably because of the rapids a short distance below the station, which ordinarily do not entirely freeze over.

Artificial control.—The operation of small storage reservoirs at the headwaters of the river, together with storage at power plants above the gaging station, modifies the flow to such an extent that it cannot be considered natural.

Cooperation.—Gage heights furnished by the Chippewa Valley Light & Power Co.

Daily gage height, in feet, of Red Cedar River at Cedar Falls, Wis., for 1912.

[Olaf Oas and Frank Wilkson, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.5	2.2	2.2	4.2	3.4	3.4	2.1	2.5	3.2	2.6	2.3	2.2
2	2.5	2.2	2.2	4.0	3.4	3.3	2.1	2.4	3.4	2.6	2.3	2.2
3	2.5	2.2	2.2	3.8	3.6	3.3	2.0	2.4	3.65	2.6	2.4	2.3
4	2.5	2.2	2.2	3.8	3.8	3.2	2.0	2.4	3.65	2.6	2.4	2.3
5	2.5	2.2	2.2	3.8	4.0	3.2	2.0	2.5	3.45	2.6	2.5	2.4
6	2.5	2.2	2.2	3.9	4.45	3.1	2.1	2.5	3.25	2.5	2.5	2.3
7	2.5	2.2	2.2	4.0	4.2	3.1	2.25	2.65	3.1	2.5	2.5	2.2
8	2.5	2.1	2.2	4.0	4.05	3.0	2.45	2.8	3.0	2.5	2.5	2.2
9	2.5	2.1	2.2	3.7	4.0	3.0	2.6	2.8	3.0	2.5	2.5	2.4
10	2.5	2.1	2.1	3.55	3.8	2.9	2.5	2.8	3.0	2.5	2.5	2.3
11	2.5	2.0	2.3	3.25	3.8	2.8	2.4	2.8	2.9	2.5	2.5	2.35
12	2.5	2.1	2.3	3.15	3.65	2.6	2.4	2.75	2.9	2.7	2.6	2.4
13	2.5	2.2	2.3	3.0	3.55	2.4	2.4	2.7	2.9	2.8	2.4	2.4
14	2.5	2.2	2.3	2.9	3.5	2.4	2.4	2.6	2.8	2.9	2.5	2.4
15	2.5	2.2	2.3	2.8	3.4	2.4	2.4	2.6	2.8	2.8	2.5	[a] 0.6
16	2.5	2.2	2.3	2.8	3.25	2.5	2.55	2.5	2.8	2.8	2.5	2.4
17	2.5	2.2	2.3	2.8	3.1	2.6	2.6	2.5	2.8	2.7	2.4	2.4
18	2.4	2.2	2.4	2.8	3.0	2.7	2.6	2.4	2.8	2.6	2.4	2.4
19	2.4	2.2	2.4	2.8	2.9	2.8	2.45	2.4	2.8	2.6	2.4	2.3
20	2.4	2.2	2.4	2.8	2.8	2.95	2.25	2.5	2.8	2.6	2.4	2.4
21	2.4	2.2	2.5	2.8	2.8	3.2	2.2	2.5	2.8	2.5	2.4	2.5
22	2.3	2.2	2.5	3.1	3.0	3.25	2.2	2.6	2.7	2.4	2.4	2.4
23	2.3	2.2	2.6	3.3	3.8	3.1	2.3	2.6	2.7	2.4	2.4	2.4
24	2.3	2.2	2.6	3.2	4.4	3.0	2.45	2.7	2.7	2.3	2.3	2.5
25	2.3	2.1	2.6	3.2	4.2	3.0	2.9	2.8	2.7	2.3	2.3	2.5
26	2.3	2.3	2.6	3.1	4.0	2.9	2.8	2.8	2.7	2.3	2.3	2.6
27	2.3	2.2	2.6	3.1	3.8	2.8	2.7	2.9	2.7	2.3	2.2	2.5
28	2.3	2.2	2.7	3.2	3.7	2.65	2.65	2.8	2.7	2.3	2.2	2.5
29	2.3	2.2	3.2	3.2	3.6	2.45	2.6	3.0	2.6	2.3	2.2	[a] 1.6
30	2.2	......	4.1	3.2	3.6	2.25	2.6	3.1	2.6	2.3	2.3	2.5
31	2.2	......	4.3	......	3.5	......	2.5	3.1	......	2.3	......	2.5

[a] Turbine in power house above gage shut down.

NOTE.—No ice reported during 1912. The observer states that when the sawmill was in existence at Cedar Falls, considerable ice formed at the rapids and at the gage, but that since the new dam and power house have been built ice does not form at these points.

ZUMBRO RIVER AT ZUMBRO FALLS, MINN.

Location.—At the highway bridge at Zumbro Falls about 8 miles below the mouth of the South Branch.

Records available.—June 8, 1909, to December 31, 1912.

Drainage area.—1,120 square miles.

Gage.—Chain gage, attached to bridge; datum unchanged.

Channel.—Slightly shifting.

Discharge measurements.—Made from bridge.

Winter flow.—For a short time during and following an extremely cold period ice forms below the gage, causing backwater. The river is, however, fed by springs in the vicinity of the gage and the warmer water gradually wears away the ice. Daily gage heights are recorded during the winter, and from a close inspection of gage heights and temperature the necessary corrections are made to the discharge.

Maximum flow.—The high water of June, 1908, is marked by a spike in a telegraph pole near the railroad station at Zumbro Falls. This is at an elevation of 26.7

feet above the datum of the gage. The high water of April, 1888, reached a stage approximately 29.7 feet, as shown by a mark not so well defined as that of the 1908 flood.

Artificial control.—The slight artificial control at the small power plants above Zumbro Falls is not observable at the gage.

Discharge measurements of Zumbro River at Zumbro Falls, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 21[a]	C. J. Emerson	7.56	1,170	May 28	S. B. Soulé	6.37	668
30	W. G. Hoyt	9.98	2,720	Aug. 15[b]	W. G. Hoyt	5.07	197
30	do	9.92	2,650				

[a] Measured from bridge; open water.

[b] Wading at 200 feet above bridge.

Daily gage height, in feet, of Zumbro River at Zumbro Falls, Minn., for 1912.

[A. H. Sugg, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.3	5.2	5.2	9.4	6.1	5.85	5.4	5.05	5.2	4.98	5.0	5.1
2	5.3	5.2	5.2	......	6.0	5.9	5.5	5.1	5.2	4.98	4.99	5.1
3	5.3	5.2	5.2	7.8	6.0	5.9	5.35	5.0	5.2	4.96	5.0	5.0
4	5.35	5.2	5.2	7.4	6.0	5.75	5.7	5.1	5.1	4.90	4.99	5.05
5	5.3	5.2	5.25	7.4	6.2	5.7	5.95	5.1	5.1	4.94	4.99	5.1
6	5.3	5.2	5.2	7.9	6.4	5.6	5.85	5.15	5.1	4.92	4.95	5.15
7	5.3	5.2	5.2	9.2	6.0	5.5	5.6	5.8	5.0	4.89	4.99	4.95
8	5.35	5.2	5.2	8.5	5.95	5.4	5.4	5.9	4.99	4.95	4.96	......
9	5.35	5.2	5.2	7.6	5.8	5.4	5.4	5.6	4.99	4.89	4.99	......
10	5.4	5.2	5.2	7.2	5.8	5.4	5.25	5.3	5.05	4.94	4.98	6.05
11	5.4	5.2	5.2	7.0	5.7	5.4	5.55	5.2	4.98	4.96	4.98	5.9
12	5.4	5.2	5.2	6.8	5.65	5.3	5.6	5.2	5.1	5.05	5.0	......
13	5.4	5.2	5.15	6.7	5.6	5.4	5.8	5.1	5.0	5.2	5.15	5.4
14	5.4	5.2	5.3	6.9	5.55	5.55	5.75	5.15	5.05	5.2	5.35	5.2
15	5.4	5.2	5.2	8.4	5.6	5.65	5.6	5.15	5.0	5.2	5.4	5.05
16	5.4	5.25	5.25	7.9	5.6	5.6	5.55	5.05	5.0	5.15	5.25	5.0
17	5.4	5.25	5.4	7.2	5.6	5.55	5.5	5.15	5.0	5.1	5.2	5.0
18	5.4	5.3	6.9	6.8	5.55	5.4	5.35	5.05	5.05	5.1	5.15	4.99
19	5.4	5.3	9.8	6.6	6.5	5.3	5.3	5.6	5.1	5.1	5.2	5.0
20	5.4	5.3	9.1	6.4	13.7	5.35	5.3	5.6	5.05	5.05	5.1	4.96
21	5.4	5.3	7.6	6.5	10.6	5.25	5.5	5.45	5.1	5.05	5.1	4.75
22	5.35	5.3	6.9	9.1	8.2	5.2	5.5	5.4	5.0	5.05	5.1	4.75
23	5.3	5.3	6.7	9.0	7.8	5.2	5.6	5.3	5.0	5.05	5.1	4.88
24	5.3	5.35	6.8	7.6	7.7	5.25	5.45	5.2	5.0	5.0	5.05	4.95
25	5.25	5.35	7.0	7.2	7.0	5.2	5.35	5.15	5.0	5.0	5.0	5.0
26	5.25	5.25	6.8	6.8	6.6	5.2	5.3	5.1	4.98	5.0	5.0	4.96
27	5.25	5.2	8.0	6.6	6.6	5.2	5.3	5.1	4.95	5.05	5.0	4.92
28	5.25	5.3	11.3	6.45	6.35	5.15	5.2	5.1	4.95	5.0	5.05	4.91
29	5.2	5.3	13.0	6.3	6.1	5.1	5.15	5.1	4.92	5.0	5.0	4.95
30	5.2	......	10.2	6.2	6.0	5.1	5.05	5.2	4.94	5.0	4.98	4.85
31	5.2	......	9.3	......	5.9	......	5.1	5.2	......	5.0	......	4.99

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 1 to 31, and Dec. 4 to 15.

Daily discharge, in second feet, of Zumbro River at Zumbro Falls, Minn., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	232	232	2,320	524	424	282	200	232	186	190	210
2	232	232	1,850	482	442	310	210	232	186	188	210
3	232	232	1,380	482	442	269	190	232	183	190	190
4	232	232	1,160	482	389	372	210	210	172	188	....
5	232	244	1,160	566	372	462	210	210	179	188	....
6	232	232	1,430	652	340	424	221	210	176	181	....
7	232	232	2,180	482	310	340	190	190	170	188	....
8	232	232	1,760	462	282	282	442	188	181	183	....
9	232	232	1,260	406	282	282	340	188	170	188	....
10	232	232	1,050	406	282	244	256	200	179	186	....
11	232	232	944	372	282	325	232	186	183	186	....
12	232	232	840	356	256	340	232	210	200	190	....
13	232	221	790	340	282	406	210	190	232	221	....
14	232	256	892	325	325	389	221	200	232	269	....
15	232	232	1,700	340	356	340	221	190	232	282	....
16	244	244	1,430	340	340	325	200	190	221	244	190
17	244	282	1,050	340	325	310	221	190	210	232	190
18	256	892	840	325	282	269	200	200	210	221	188
19	256	2,590	742	696	256	256	340	210	210	232	190
20	256	2,120	652	5,860	269	256	340	200	200	210	183
21	256	1,260	696	3,180	244	310	296	210	200	210	149
22	256	892	2,120	1,600	232	310	282	190	200	210	149
23	256	790	2,060	1,380	232	340	256	190	200	210	166
24	269	840	1,260	1,320	244	296	232	190	190	200	181
25	269	944	1,050	944	232	269	221	190	190	190	190
26	244	840	840	742	232	256	210	186	190	190	183
27	232	1,480	742	742	232	256	210	181	200	190	176
28	256	3,760	674	630	221	232	210	181	190	200	174
29	256	5,200	608	524	210	221	210	176	190	190	181
30	....	2,880	566	482	210	200	232	179	190	186	164
31	....	2,250	....	442	....	210	232	....	190	....	188

NOTE.—Daily discharge computed from a rating table well defined between 190 and 3,500 second-feet (gage heights 5.0 and 11.0 feet), and fairly well defined throughout the remainder of the range of stage covered by 1912 gage heights.

Discharge Apr. 2 interpolated. Discharge Jan. 1 to 31 estimated, because of ice, from discharge of adjacent drainage areas as 90 per cent of open-water flow for same gage heights. Mean discharge Dec. 4 to 15 estimated, because of ice, at 185 second-feet.

Monthly discharge of Zumbro River at Zumbro Falls, Minn., for 1912.

[Drainage area, 1,390 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	245	0.176	0.20	C.
February	269	232	242	.174	.19	B.
March	5,200	221	993	.714	.82	A.
April	2,320	566	1,200	.863	.96	A.
May	5,860	325	846	.609	.70	A.
June	442	210	294	.212	.24	A.
July	462	200	303	.218	.25	A.
August	442	190	241	.173	.20	A.
September	232	176	198	.142	.16	A.
October	232	170	195	.140	.16	A.
November	282	181	204	.147	.16	A.
December	....	....	183	.132	.15	B.
The year	5,860	....	429	.309	4.19	

NOTE.—See footnotes to table of daily discharge.

SOUTH BRANCH OF ZUMBRO RIVER NEAR ZUMBRO FALLS, MINN.

Location.—At the Woodville bridge, 1¼ miles above the mouth of the river, in sec. 22, T. 109 N., R. 14 W., 6 miles below the mouth of the Middle Branch.

Records available.—June 16, 1911, to December 31, 1912.

Drainage area.—821 square miles.

Gage.—Chain gage, attached to bridge; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from highway bridge.

Winter flows.—The river freezes over in the vicinity of the gage following long cold periods. The rapids below the gage, however, remain partly open so that the backwater effect is small. Discharge measurements are made to aid in the winter estimates.

Artificial control.—The small power plants above the station do not control the flow to such an extent as to be noticeable at the gage.

Discharge measurements of South Branch of Zumbro River near Zumbro Falls, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan 26[a]	W. G. Hoyt	2.20	141	Mar 30	W. G. Hoyt	6.25	2,680
Mar 22[b]	C. J. Emerson	3.28	633	May 28	S. B. Soulé	2.95	495
30	W. G. Hoyt	6.36	2,930	Aug 15[c]	W. G. Hoyt	2.06	140

[a] Complete ice cover; average thickness, 0.90 foot; average distance water surface to top of ice, 0.00 foot.

[b] At bridge section; open water.

[c] Wading measurement below bridge, 5 feet.

Daily gage height, in feet, of South Branch of Zumbro River near Zumbro Falls, Minn., for 1912.

[W. M. Whipple, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.30	2.00	2.20	5.5	2.6	2.6	2.19	1.99	2.11	1.96	1.99	2.01
2	2.25		2.20	4.9	2.55	2.6	2.40	2.09	2.06	1.96	1.99	2.06
3	2.25		2.20	4.2	2.6	2.65	2.26	1.99	2.04	1.99	1.99	2.09
4			2.20	3.9	2.6	2.6	2.36	2.06	2.04	1.94	1.99	2.04
5		2.10	2.15	3.9	2.9	2.5	2.6	2.01	2.06	1.94	1.96	2.01
6			2.10	4.3	2.8	2.45	2.50	2.00	2.01	1.99	1.94	2.04
7			2.15	4.8	2.6	2.41	2.38	2.09	2.01	2.01	1.96	2.04
8		2.00	2.20	4.7	2.5	2.39	2.28	2.16	2.95	1.96	1.94	1.99
9			2.20	4.2	2.41	2.34	2.21	2.22	2.5	1.99	1.96	2.01
10			2.20	3.6	2.41	2.30	2.16	2.22	2.95	1.99	1.94	2.01
11	1.80		2.15	3.4	2.32	2.31	2.38	2.04	2.5	1.96	1.94	2.02
12		2.10	2.31	3.2	2.28	2.31	2.31	2.11	2.01	2.06	1.99	1.94
13			2.32	3.1	2.28	2.29	2.35	2.14	2.00	2.19	2.08	1.91
14			2.30	3.25	2.28	2.38	2.36	2.01	2.04	2.14	2.19	1.96
15		2.15	3.0	4.5	2.35	2.44	2.29	2.09	2.01	2.09	2.14	1.99
16	2.05		3.1	4.0	2.31	2.41	2.32	2.06	2.00	2.08	2.14	1.96
17		2.00	2.20	3.6	2.29	2.39	2.30	2.12	2.04	2.09	2.09	1.99
18			3.8	3.25	2.29	2.34	2.24	2.09	2.02	2.06	2.04	1.96
19	2.15	2.5	4.8	3.0	2.6	2.29	2.21	2.18	2.01	2.01	2.05	1.99
20		2.5	4.9	2.9	10.0	2.24	2.18	2.38	2.05	2.01	2.06	1.95
21		3.4	3.8	3.5	6.2	2.19	2.39	2.28	2.04	2.04	2.01	1.82
22	2.15	2.25	3.4	5.2	4.6	2.19	2.36	2.21	2.00	2.01	2.01	1.91
23		2.35	3.2	4.9	4.4	2.15	2.36	2.16	2.00	2.01	2.04	1.94
24		2.30	3.0	3.7	4.1	2.15	2.32	2.11	2.04	2.01	2.01	1.92
25	2.10	2.35	3.05	3.4	3.5	2.16	2.16	2.06	2.04	1.98	1.99	1.96
26	2.20	2.30	3.0	3.1	3.2	2.11	2.21	2.04	2.01	1.99	1.99	1.91
27		2.15	4.9	3.0	3.1	2.14	2.16	2.02	2.00	2.00	1.99	1.94
28		2.20	7.3	2.8	3.0	2.16	2.19	2.04	2.01	1.99	2.01	1.89
29	2.25	2.20	8.8	2.7	2.85	2.14	2.14	2.01	1.96	2.01	1.96	1.84
30			6.2	2.65	2.75	2.14	2.01	2.11	1.92	1.99	2.00	1.86
31			5.4		2.7		2.14	2.06		1.96		1.91

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Feb. 21; probably no backwater at the gage from ice during December.

Daily discharge, in second-feet, of South Branch of Zumbro River near Zumbro Falls, Minn., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		183	2,040	337	337	180	112	152	103	112	118
2		183	1,580	317	337	258	145	135	103	112	135
3		183	1,130	337	358	205	112	128	112	112	145
4		183	955	337	337	243	135	128	96	112	128
5		166	955	462	297	337	118	135	96	103	118
6		148	1,190	420	278	297	115	118	112	96	128
7		166	1.510	337	262	250	145	118	118	103	128
8		183	1,440	297	254	213	169	484	103	96	112
9		183	1,130	262	235	187	190	297	112	103	118
10		183	790	262	220	169	190	484	112	96	118
11		166	690	228	224	250	128	297	103	96	122
12		224	595	213	224	224	152	118	135	112	96
13		228	550	213	216	239	162	115	180	141	87
14		220	618	213	250	243	118	128	162	180	103
15		505	1,320	239	274	216	145	118	145	162	112
16		550	1.010	224	262	228	135	115	141	162	103
17		183	790	216	254	220	155	128	145	145	112
18		900	618	216	235	198	145	122	135	128	103
19		1,510	505	337	216	187	176	118	118	132	112
20		1,580	462	7,110	198	176	250	132	118	135	100
21		900	740	2,700	180	254	213	128	128	118	66
22	202	690	1,790	1.380	180	243	187	115	118	118	87
23	239	595	1,580	1,250	166	243	169	115	118	128	96
24	220	505	845	1,070	166	228	152	128	118	118	90
25	239	528	690	740	169	169	135	128	109	112	103
26	220	505	550	595	152	187	128	118	112	112	87
27	166	1.580	505	550	162	169	122	115	115	112	96
28	183	3.850	420	505	169	180	128	118	112	118	82
29	183	5.610	378	441	162	162	118	103	118	103	71
30		2,700	358	399	162	118	152	90	112	115	75
31		1,960		378		162	135		103		87

NOTE.—Daily discharge computed from a rating curve well defined between 62 and 3,520 second-feet (gage heights 1.8 and 7.0 feet). Above discharge 3,520 second-feet (gage height 7.0 feet) the rating curve is an extension and is subject to an error of about 10 per cent at discharge 7,110 second-feet (gage height 10.0 feet).

Discharge Jan. 1 to Feb. 21 estimated, because of ice, from climatologic records, discharge measurements, observer's notes, and discharge of adjacent drainage areas, as follows: Jan. 1 to 31, 165 second-feet, varying from about 200 to 140 second-feet; Feb. 1 to 21, 130 second-feet.

Monthly discharge of South Branch of Zumbro River near Zumbro Falls, Minn., for 1912.

[Drainage area, 821 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			165	0.201	0.23	C.
February	239		151	.184	.20	C.
March	5,610	148	879	1.07	1.23	A.
April	2,040	358	924	1.13	1.26	A.
May	7,110	213	729	.888	1.02	A.
June	358	152	231	.281	.31	B.
July	337	118	214	.261	.30	B.
August	250	112	150	.183	.21	B.
September	484	90	158	.192	.21	B.
October	180	96	120	.146	.17	B.
November	180	96	120	.146	.16	B.
December	145	66	104	.127	.15	C.
The year	7,110		329	.401	5.45	

NOTE.—See footnotes to table of daily discharge.

ROOT RIVER NEAR HOUSTON, MINN.

Location.—At highway bridge 1 mile east of Houston in sec. 34, T. 104 N., R. 6 W., 1 mile above the mouth of South Root River, ordinarily a relatively insignificant stream, but during heavy rains overflowing its banks badly and flooding considerable area.

Records available.—May 28, 1909, to December 31, 1912.

Drainage area.—1,560 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Shifting; scouring out during floods, and gradually filling in afterward; nearly permanent at low stages.

Discharge measurements.—Made from bridge.

Winter flow.—During the ice period of 1912 the readings were discontinued and the flow has been estimated from the flow of North Branch Root near Lanesboro, there being a well-defined open-water relation between these stations.

Artificial control.—No dam below the station; nearest dam above is at Rushford. As the flow is ample at all times for the power generated at that point, it is not held back during certain portions of the day, and thus the dam has no appreciable influence on the gage heights at Houston.

Accuracy.—The shifting channel renders it necessary to make more frequent measurements than at other stations, and the results based on them can probably not be considered better than fair or possibly good, except for low stages when the channel changes but little.

Discharge measurements of Root River near Houston, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 31	C. J. Emerson	8.88	5,930
Apr. 30	S. B. Soulé	2.24	650
Sept. 5	....do	1.32	383

Daily gage height, in feet, of Root River near Houston, Minn., for 1912.

[Olaf Larson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				8.9	2.2	2.5	1.5	1.6	1.5	1.4	1.4	1.4
2				7.5	2.1	3.8	1.8	1.5	1.4	1.4	1.4	1.7
3				5.9	2.1	3.0	1.9	1.6	1.4	1.3	1.4	1.5
4				5.1	2.3	2.7	1.8	1.5	1.4	1.3	1.4	1.5
5				5.0	2.6	2.5	1.6	1.4	1.4	1.3	1.4	1.5
6				5.1	2.2	2.3	1.5	1.6	1.6	1.3	1.4	1.6
7				5.7	2.1	2.2	1.6	3.0	1.4	1.3	1.4	1.3
8				5.6	2.0	2.1	1.4	1.8	1.4	1.3	1.4	1.4
9				4.5	1.9	2.0	1.8	1.6	1.3	1.3	1.4	2.8
10				3.9	1.9	1.9	8.0	1.6	1.6	1.3	1.3	
11				3.6	1.9	1.9	6.1	1.7	1.5	1.3	1.4	
12				3.3	1.8	1.9	3.6	1.5	1.4	1.8	1.4	
13				3.2	1.8	1.9	3.2	1.5	1.3	1.9	1.6	
14				3.5	1.8	1.9	3.1	1.5	1.4	1.8	1.5	
15				3.5	1.8	1.9	2.7	1.4	1.5	1.7	1.6	
16				4.1	1.7	1.9	2.4	1.4	1.4	1.6	1.6	
17				3.5	1.7	1.8	2.2	1.5	1.4	1.5	1.5	
18				3.1	1.6	1.7	2.1	1.5	1.5	1.5	1.4	
19				2.9	1.7	1.7	2.0	1.6	1.6	1.4	1.4	
20				2.7	7.7	1.6	2.6	1.6	1.6	1.5	1.4	
21				2.6	3.9	1.6	2.8	1.7	1.5	1.5	1.4	
22				2.6	2.8	1.6	2.4	1.6	1.5	1.5	1.5	
23				4.0	5.6	1.6	2.7	1.5	1.4	1.4	1.4	
24				4.0	7.8	1.5	2.3	1.5	1.4	1.4	1.4	
25				3.2	5.2	1.5	2.0	1.5	1.4	1.4	1.4	
26			2.6	2.8	3.9	1.4	1.9	1.4	1.4	1.4	1.4	
27			2.6	2.6	3.4	1.4	1.8	1.4	1.4	1.4	1.4	
28			7.3	2.5	3.1	1.4	1.8	1.3	1.4	1.4	1.2	
29			9.4	2.4	3.3	1.4	1.7	1.3	1.3	1.4	1.3	
30			9.8	2.3	2.7	1.6	1.6	1.6	1.3	1.4	1.3	
31			8.9		2.5		1.6	1.5		1.4		

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 25 and about Dec. 9 to 31.

Daily discharge, in second-feet, of Root River near Houston, Minn., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	5,960	632	739	430	456	430	405	405	405
2	....	4,270	598	1,280	509	430	405	405	405	482
3	....	2,660	598	930	537	430	405	380	405	430
4	....	2,050	667	813	509	430	405	380	405	430
5	....	1,980	776	739	456	405	405	380	405	430
6	....	2,050	632	667	430	456	456	380	405	456
7	....	2,500	598	632	456	930	405	380	405	380
8	....	2,420	566	598	405	509	405	380	405	405
9	....	1,660	537	566	509	456	380	380	405	....
10	....	1,330	537	537	4,870	456	456	380	380	....
11	....	1,180	537	537	2,840	482	430	380	405	....
12	....	1,050	509	537	1,180	430	405	509	405	....
13	....	1,010	509	537	1,010	430	380	537	456	....
14	....	1,140	509	537	970	430	405	509	430	....
15	....	1,140	509	537	813	405	430	482	456	....
16	....	1,440	482	537	703	405	405	456	456	....
17	....	1,140	482	509	632	430	405	430	430	....
18	....	970	456	482	598	430	430	430	405	....
19	....	890	482	482	566	456	456	405	405	....
20	....	813	4,510	456	776	456	456	430	405	....
21	....	776	1,330	456	851	482	430	430	405	....
22	....	776	851	456	703	456	430	430	430	....
23	....	1,380	2,420	456	813	430	405	405	405	....
24	....	1,380	4,630	430	667	430	405	405	405	....
25	....	1,010	2,120	430	566	430	405	405	405	....
26	776	851	1,330	405	537	405	405	405	405	....
27	776	776	1,100	405	509	405	405	405	405	....
28	4,040	739	970	405	509	380	405	405	356	....
29	6,590	703	1,050	405	482	380	380	405	380	....
30	7,090	667	813	456	456	456	380	405	380	....
31	5,960	....	739	....	456	430	....	405	....	....

NOTE.—Daily discharge computed from a well-defined rating curve.

Discharge Jan. 1 to Mar. 26 and Dec. 9 to 31 estimated, because of ice, from climatologic records and open-water relation between flow of North Branch of Root River near Lanesboro and Houston, as follows: Jan. 1 to 13, 485 second-feet; Feb. 1 to 29, 400 second-feet; Mar. 1 to 25, 540 second-feet; Dec. 9 to 31, 285 second-feet.

Monthly discharge of Root River near Houston, Minn., for 1912.

[Drainage area, 1,560 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	485	0.311	0.36	
February	....	....	400	.256	.28	
March	7,090	....	1,250	.801	.92	
April	5,960	667	1,560	1.00	1.12	B.
May	4,630	456	1,050	.673	.78	B.
June	1,280	405	565	.362	.40	B.
July	4,870	405	831	.533	.61	B.
August	930	380	451	.289	.33	B.
September	456	380	413	.265	.30	B.
October	537	380	417	.267	.31	B.
November	456	356	408	.262	.29	B.
December	....	....	322	.206	.24	D.
The year	7,090	....	680	.436	5.94	

NOTE.—See footnotes to tables of daily gage height and daily discharge.

NORTH BRANCH OF ROOT RIVER NEAR LANESBORO, MINN.

Location.—At the first highway bridge 1 mile above the junction of the North and South branches, in sec. 6, T. 103 N., R. 9 W., in Fillmore County, 2 miles north of Lanesboro and about 5 miles below a small creek that enters from the west.

Records available.—March 9, 1910, to December 31, 1912.

Drainage area.—647 square miles.

Gage.—Chain; datum unchanged.

Channel.—Probably permanent. As there is more than 10 feet fall between the station and the mouth of the South Branch backwater from that stream is improbable. One thousand feet back from the right bank there is an old channel through which the river formerly flowed. At a stage of 6 feet the flow begins through this old channel. At extreme flood stage the right bank is overflowed for a width of one-fourth mile.

Discharge measurements.—Made from the bridge. At extreme flood stages measurements can be made from the railroad bridge just above the junction with the South Branch.

Winter flow.—From December to March the river is frozen over and current-meter measurements are made to determine the winter discharge.

Discharge measurements of North Branch of Root River near Lanesboro, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 24[a]	W. G. Hoyt	2.90	160	Sept. 5	S. B. Soulé	2.29	225
Feb. 16[b]	S. B. Soulé	2.98	154	5	.....do	2.26	216
Apr. 30	.....do	2.54	313				

[a] Complete ice cover; average thickness of ice, 1.12 feet; average distance water surface to top of ice, 0.00 foot.

[b] Complete ice cover; average thickness of ice, 1.10 feet; average distance water surface to top of ice, 0.13 foot.

Daily gage height, in feet, of North Branch of Root River near Lanesboro, Minn., for 1912.

[K. E. Holum, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	2.9		6.0	2.5	2.65	2.21	2.10	2.12	2.06	2.05	2.05
2				4.8	2.42	2.95	2.29	2.06	2.08	2.08	2.05	2.10
3				4.0	2.6	2.8	2.28	2.10	2.02	2.08	2.05	2.08
4	2.8		2.5	3.8	2.55	2.65	2.34	2.12	2.06	2.05	2.05	2.05
5		2.9		3.9	2.5	2.6	2.25	2.16	2.38	2.04	2.05	2.15
6				4.1	2.5	2.48	2.26	2.20	2.18	2.05	2.02	2.20
7			2.40	4.6	2.42	2.38	2.30	2.20	2.10	2.05	2.02	2.16
8	2.9	2.95		4.2	2.39	2.28	2.20	2.18	2.10	2.05	2.00	2.12
9				3.5	2.35	2.26	2.22	2.12	2.05	2.02	2.02	2.08
10				3.15	2.35	2.25	4.0	2.10	2.05	2.02	2.02	2.05
11	2.9		2.30	3.1	2.35	2.20	2.9	2.10	2.00	2.05	2.02	2.06
12		3.15		3.05	2.32	2.20	2.85	2.10	2.00	2.18	2.09	2.06
13				3.0	2.32	2.25	2.7	2.06	2.12	2.5	2.18	2.06
14			2.40	3.05	2.29	2.30	2.75	2.00	2.14	2.30	2.14	2.05
15	2.9	3.1		3.75	2.30	2.24	2.6	2.00	2.15	2.20	2.15	2.05
16				3.5	2.29	2.20	2.45	2.08	2.08	2.16	2.15	2.06
17				3.05	2.28	2.20	2.30	2.10	2.12	2.12	2.15	2.02
18	2.7		2.30	2.9	2.28	2.18	2.34	2.18	2.22	2.12	2.19	1.98
19		2.9	4.2	2.75	2.30	2.18	2.22	2.24	2.34	2.15	2.22	1.98
20			4.8	2.7	4.8	2.18	2.30	2.28	2.28	2.15	2.35	
21			3.2	2.7	2.65	2.18	2.61	2.32	2.14	2.19	2.28	
22	2.9	2.6	3.05	3.4	2.6	2.18	2.42	2.35	2.15	2.21	2.22	
23			3.1	4.4	7.3	2.18	2.42	2.28	2.06	2.10	2.15	
24			2.95	3.4	5.2	2.12	2.30	2.11	2.00	2.05	2.12	
25	2.85		2.85	3.0	3.6	2.12	2.20	2.02	2.08	2.05	2.11	
26		2.40	2.7	2.8	3.1	2.10	2.28	2.00	2.05	2.05	2.11	1.9
27			3.1	2.75	2.9	2.10	2.12	2.00	2.06	2.05	2.09	
28			5.2	2.65	2.85	2.10	2.12	2.00	2.08	2.05	2.05	
29	2.85	2.40	9.1	2.6	2.8	2.10	2.20	2.02	2.08	2.05	2.05	
30			7.4	2.6	2.6	2.10	2.20	2.18	2.02	2.05	2.00	
31			6.6		2.5		2.10	2.15		2.05		

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 25 and about Dec. 9 to 31.

Daily discharge, in second-feet, of North Branch of Root River near Lanesboro, Minn., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		3,400	284	386	196	157	164	144	141	141
2		2,040	250	541	226	144	150	150	141	157
3		1,250	329	461	222	157	131	150	141	150
4		1,080	306	386	246	164	144	141	141	141
5		1,160	284	362	211	178	263	137	141	174
6		1,340	284	306	215	192	185	141	131	192
7		1,830	250	263	230	192	157	141	131	178
8		1,430	238	222	192	185	157	141	125	164
9		850	222	215	199	164	141	131	131	
10		617	222	211	1,310	157	141	131	131	
11		587	222	192	514	157	125	141	131	
12		558	211	192	487	157	125	185	154	
13		530	211	211	410	144	164	316	185	
14		558	199	230	435	125	171	230	171	
15		1,040	203	207	362	125	174	192	174	
16		850	199	192	293	150	150	178	174	
17		558	196	192	230	157	164	164	174	
18		476	196	185	246	185	199	164	189	
19		400	203	185	199	207	246	174	199	
20		376	2,040	185	230	222	222	174	250	
21		376	352	185	367	238	171	199	222	
22		779	329	185	280	250	174	196	199	
23		1,620	5,090	185	280	222	144	157	174	
24		779	2,520	164	230	160	125	141	164	
25		530	970	164	192	131	150	141	160	
26	376	425	629	157	222	125	141	141	160	
27	587	400	514	157	164	125	144	141	154	
28	2,480	352	487	157	164	125	150	141	141	
29	7,640	329	461	157	192	131	150	141	141	
30	5,200	329	362	157	192	185	131	141	125	
31	4,140		316		157	174		141		

NOTE.—Daily discharge computed from rating well-defined curves. Rating table applied indirectly May 23, 24, 25 and new table used subsequent to May 26. Discharge Jan. 1 to Mar. 25 and Dec. 9 to 31 estimated, because of ice, from climatologic records, discharge measurements, and gage heights, as follows: Jan. 1 to 30, 180 second-feet, varying from about 230 to 150 second-feet; Feb. 1 to 29, 150 second-feet, varying from about 150 to 180 second-feet; Mar. 1 to 25, 200 second-feet, varying from about 180 to 400 second-feet; Dec. 9 to 31, 120 second-feet.

Monthly discharge of North Branch of Root River near Lanesboro, Minn., for 1912.

[Drainage area, 647 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			180	0.278	0.32	C.
February			150	.232	.25	C.
March	7,640		820	1.27	1.46	C.
April	3,400	329	895	1.38	1.54	A.
May	5,090	196	599	.926	1.07	B.
June	541	157	233	.360	.40	B.
July	1,310	157	293	.453	.52	B.
August	250	125	167	.258	.30	A.
September	263	125	162	.251	.28	B.
October	316	131	161	.249	.29	B.
November	250	125	160	.247	.28	B.
December	192		131	.202	.23	C.
The year	7,640		330	.510	6.94	

NOTE.—See footnotes to tables of daily gage height and daily discharge.

WISCONSIN RIVER NEAR RHINELANDER, WIS.

Location.—At the highway bridge about 400 feet below Forbes & Wixson's power plant, about 8 miles southwest of Rhinelander, Wis., in sec. 27, T. 36 N., R. 8 E., 8 miles below the mouth of Pelican River.

Records available.—December 1, 1905, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from downstream side of bridge to which gage is attached.

Winter flow.—The winters are severe, but little if any ice forms at the gage.

Artificial control.—The natural flow of the stream is much modified by the operation of power plants and by storage above the station.

Accuracy.—The fluctuation of the load on the turbines may affect discharge measurements, but it is thought that the records give the flow at the section accurately. As the station was last visited in July, 1908, estimates of discharge are withheld until the discharge rating curve and the permanency of the gage datum are checked.

Cooperation.—Gage heights furnished by the Wisconsin Valley Improvement Co.

Daily gage height, in feet, of Wisconsin River near Rhinelander, Wis., for 1912.

[G. N. Kramer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	3.1	3.3	2.9	3.4	4.0	3.3	3.4	3.1	3.3	3.2	2.0
2	3.5	3.0	3.4	3.3	3.4	3.6	3.1	3.5	4.7	3.4	3.4	3.6
3	3.3	3.1	2.8	3.4	3.2	3.4	3.1	3.7	5.3	3.0	2.7	3.4
4	3.3	3.0	3.5	3.5	3.6	3.2	2.4	3.0	5.1	3.2	3.4	3.2
5	3.3	3.9	3.1	3.9	3.4	3.7	3.2	3.5	5.4	3.5	3.7	3.3
6	3.2	3.9	3.1	4.2	3.5	3.5	3.4	3.7	5.7	2.4	3.6	3.6
7	2.9	3.9	3.4	4.5	3.5	3.4	1.9	4.2	5.2	3.1	3.4	3.4
8	3.3	3.9	3.3	4.0	3.3	3.4	3.3	4.6	4.6	3.5	3.5	2.4
9	3.5	4.0	3.2	4.3	3.4	3.0	3.3	5.2	5.1	3.6	3.4	3.3
10	3.8	4.1	2.5	4.4	3.7	3.1	3.4	5.7	4.8	3.1	2.9	3.5
11	3.8	3.8	2.8	4.3	3.7	3.3	3.2	6.0	4.6	3.1	3.3	3.1
12	3.7	3.9	3.0	4.4	3.0	3.3	3.2	5.6	4.7	3.5	3.5	3.2
13	3.8	3.8	3.1	4.5	3.2	3.4	3.1	5.7	4.6	2.1	3.4	3.4
14	3.2	3.8	3.0	3.5	3.5	2.9	1.8	5.4	4.6	3.3	3.3	3.4
15	3.7	3.8	3.0	4.3	3.4	2.9	3.2	5.2	3.0	3.5	3.2	2.1
16	3.6	3.7	3.1	4.3	3.1	2.2	3.4	5.3	3.9	3.2	3.2	3.4
17	3.8	3.5	1.9	4.3	3.5	3.0	3.3	5.2	3.6	3.3	2.8	3.2
18	3.7	3.2	3.2	4.2	3.4	3.1	3.1	3.0	3.6	3.1	3.4	3.3
19	3.8	3.7	3.0	3.9	3.0	3.4	3.1	4.9	3.1	3.5	3.4	3.1
20	3.8	3.9	3.1	3.7	3.3	2.9	3.4	4.7	3.1	2.7	3.4	3.1
21	2.7	3.8	2.8	3.7	3.4	3.1	2.0	4.7	3.3	3.4	3.3	3.0
22	3.6	3.7	2.7	3.8	3.2	3.2	3.0	4.6	2.9	3.4	3.5	2.7
23	3.7	3.8	2.9	3.7	3.4	1.8	3.0	4.6	3.0	3.2	3.3	2.9
24	3.5	3.9	1.8	3.5	3.5	3.2	3.2	4.4	3.0	3.3	2.7	2.7
25	3.2	3.8	3.1	3.5	3.7	3.4	3.4	3.2	3.4	3.4	3.3	2.8
26	3.2	3.9	2.8	3.4	3.5	3.1	3.4	4.2	3.4	3.3	3.3	2.6
27	3.3	3.9	2.9	3.4	3.4	3.0	3.6	4.5	3.1	2.6	3.4	2.9
28	3.0	3.7	3.8	3.4	3.4	3.1	3.1	4.6	3.1	3.3	3.2	2.9
29	3.3	3.4	3.4	4.4	3.7	2.9	3.7	4.4	2.7	3.5	3.2	2.7
30	3.2	......	2.7	4.3	3.8	2.0	3.4	4.4	3.3	3.2	3.0	2.6
31	3.2	......	2.0	......	3.7	......	3.5	4.4	......	3.4	......	2.6

NOTE.—Ice along shore at gage Jan. 1 to Mar. 23 and Dec. 6 to 31.

WISCONSIN RIVER AT MERRILL, WIS.

Location.—At highway bridge at east end of Merrill, Wis., one-half mile below the mouth of Prairie River.

Records available.—November 17, 1902, to December 31, 1912.

Drainage area.—2,630 square miles.

Gage.—Standard gage attached to bridge; datum unchanged.

Channel.—Probably permanent; current swift.

Discharge measurements.—Made from bridge to which gage is attached.

Winter flow.—Winters are severe but the swift current prevents the river from freezing across at the gage. Relation between gage height and discharge is, however, affected by backwater at times, caused by ice at or below the gage.

Artificial control.—The flow is affected by operation of power plants above the station and by storage.

Accuracy.—During the logging season gage heights are affected by backwater caused by log jams. Except as the gage readings may be affected by conditions above noted, the records are reliable and accurate. As this station has not been visited since February, 1909, estimates of discharge are withheld until the discharge rating curve and the permanency of the gage datum are checked.

Cooperation.—Gage heights furnished by the Wisconsin Valley Improvement Co.

Daily gage height, in feet, of Wisconsin River at Merrill, Wis., for 1912.

[A. F. Luck, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.4	5.6	5.4	4.0	7.0	6.6	3.8	5.4	11.5	5.3	5.1	5.55
2	5.4	5.6	5.4	5.6	7.0	6.6	3.75	5.1	12.5	5.35	4.95	5.65
3	5.4	5.6	5.4	5.7	6.6	6.6	5.0	4.5	7.6	5.5	4.65	5.55
4	5.4	5.6	5.2	6.2	6.8	6.6	4.9	4.5	9.2	5.3	5.0	6.15
5	5.2	5.4	4.9	6.6	7.7	6.6	4.6	4.4	8.0	5.1	5.05	6.35
6	5.0	5.4	5.2	7.8	7.6	6.4	4.45	4.8	8.0	5.45	5.4	5.95
7	5.2	5.4	5.1	8.2	7.5	6.4	4.6	5.4	7.6	5.5	4.95	5.8
8	5.6	5.4	5.1	8.6	7.5	6.2	4.6	6.0	7.4	5.3	4.95	5.65
9	5.4	5.4	5.0	8.2	7.1	6.2	4.4	6.8	7.1	5.6	4.9	5.65
10	5.8	5.4	5.0	7.9	6.6	5.6	4.8	9.1	6.5	5.6	5.05	5.55
11	5.8	5.5	5.0	8.0	6.6	4.6	5.0	9.7	6.2	5.45	4.95	5.8
12	6.0	5.6	5.1	7.8	6.7	5.1	5.0	9.6	6.1	5.45	5.0	5.2
13	5.8	5.3	4.6	7.8	6.4	5.4	4.8	8.8	6.0	6.35	5.65	5.55
14	5.7	5.6	5.1	7.4	5.6	4.9	4.6	7.6	6.2	6.6	5.3	5.6
15	5.5	5.5	5.0	7.7	6.6	5.1	4.45	7.4	6.2	6.2	5.25	5.35
16	5.5	5.6	4.8	7.8	6.9	5.1	4.45	6.8	6.1	5.95	5.35	5.3
17	5.6	5.8	4.6	7.5	5.7	4.8	4.8	7.0	6.1	6.0	5.25	5.55
18	5.6	5.6	4.8	7.4	6.0	5.3	4.6	6.8	5.9	6.0	4.8	5.6
19	5.4	5.6	4.6	7.0	6.2	4.6	4.7	6.8	6.0	6.1	5.15	5.25
20	5.3	5.6	4.8	7.0	6.2	5.3	4.2	7.0	5.8	5.85	4.95	5.05
21	5.6	5.6	5.0	7.0	6.2	5.3	4.6	6.8	5.9	5.45	5.15	5.3
22	5.4	5.6	4.9	7.8	6.7	4.9	4.4	6.5	6.1	5.15	5.15	5.15
23	5.2	5.2	4.8	8.8	7.8	5.2	5.2	6.4	5.6	5.4	5.1	5.0
24	5.2	5.4	4.9	8.4	8.3	5.0	13.6	6.3	5.4	5.45	5.05	5.25
25	5.2	5.4	4.7	7.6	7.9	5.1	10.2	6.2	5.6	5.4	4.9	5.2
26	5.5	5.3	4.6	7.2	7.2	5.2	8.4	5.6	5.8	5.1	5.05	5.0
27	5.6	5.1	5.0	7.6	7.7	5.3	7.4	6.2	5.2	5.2	5.0	4.75
28	5.6	5.5	4.8	7.5	8.1	4.6	6.4	6.0	5.2	5.1	4.95	4.95
29	5.3	5.4	5.4	7.4	8.2	4.4	5.8	6.0	4.8	5.3	5.05	4.6
30	5.4	......	5.0	7.2	7.8	5.2	5.6	6.4	5.4	5.05	5.1	4.8
31	5.4	......	4.6	......	7.6	......	5.4	6.6	......	5.0	......	5.15

NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably not affected by ice during 1912.

WISCONSIN RIVER NEAR NECEDAH, WIS.

Location.—At the highway bridge about 3 miles east of Necedah, Wis., on the road from Necedah to Strongs Prairie, 5 miles above the mouth of Big Roche a Cri Creek.

Records available.—December 2, 1902, to December 31, 1912.

Drainage area.—About 5,800 square miles.

Gage.—Standard chain gage attached to bridge. As the gage has not been checked with level since February, 1909, the present datum may be slightly in error.

Discharge measurements.—Made from bridge to which gage is attached.

Channel.—Shifts during floods.

Winter flow.—Ice forms from 1 to 2 feet in thickness, lasts about three months, and modifies the relation between gage height and discharge.

Accuracy.—As the station was last visited in February, 1909, estimates of discharge are withheld from publication.

Cooperation.—Gage-height records are furnished by the Wisconsin Valley Improvement Co.

Daily gage height, in feet, of Wisconsin River near Necedah, Wis., for 1912.

[Michael Coughlin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				7.2	9.8	11.0	5.8	8.2	8.8	6.8	6.0	5.5
2			7.4	8.0	9.0	10.0	5.6	7.7	9.4	6.6	5.9	5.6
3		7.6		8.1	8.8	9.0	5.2	7.4	11.0	6.4	6.0	6.2
4				8.4	8.4	8.7	5.4	7.1	13.6	6.2	5.8	6.4
5				8.8	8.2	8.2	5.2	6.8	15.7	6.3	5.9	7.1
6	8.3			9.7	8.1	8.0	5.8	6.8	15.0	6.4	5.4	7.7
7				10.1	8.9	7.7	4.9	6.7	13.6	6.1	6.0	7.9
8				10.8	9.7	7.3	5.6	6.4	12.6	6.4	5.8	8.0
9			7.2	11.6	10.0	7.3	5.6	6.3	11.7	6.2	5.9	6.8
10		7.5		12.2	9.6	6.6	5.4	7.2	10.4	6.4	5.8	6.5
11				11.8	8.9	7.0	5.4	8.7	9.4	6.2	5.6	6.8
12				10.8	8.4	6.9	5.4	10.2	9.2	6.4	5.9	8.0
13	8.3			10.1	8.2	6.1	5.5	11.8	8.6	6.5	6.0	8.5
14				9.9	8.6	6.4	6.0	12.8	8.3	6.4	5.9	8.7
15				9.6	8.4	6.1	5.5	12.7	7.9	7.6	6.2	8.8
16			7.1	9.4	8.0	6.3	5.6	11.6	7.8	7.6	6.3	8.4
17		7.6		9.8	7.9	5.7	6.2	10.0	7.5	7.4	6.2	8.5
18				9.8	8.2	6.4	6.1	9.3	7.6	7.3	6.0	8.6
19				9.5	8.1	5.8	6.0	8.9	7.4	7.1	6.2	8.3
20	7.8			9.5	8.0	5.9	5.8	9.1	7.6	6.8	6.1	8.4
21				8.6	8.3	6.0	5.8	9.2	7.5	6.4	5.9	8.5
22				8.5	8.1	6.0	5.6	9.1	7.5	6.6	6.0	7.4
23			7.2	8.5	8.6	5.6	5.0	8.8	7.3	6.5	6.0	8.3
24		7.4		10.0	9.2	5.2	6.9	8.5	7.2	6.2	6.0	8.1
25				11.1	9.7	5.9	10.1	8.0	7.1	6.3	6.3	7.9
26				11.2	10.0	5.5	13.6	8.0	7.0	6.4	6.2	8.0
27	10.6			11.2	9.9	5.7	14.4	7.5	6.9	6.4	6.0	7.7
28				9.7	9.5	5.6	14.6	7.3	6.8	6.2	5.9	7.5
29				10.0	9.7	5.7	12.7	7.9	6.8	6.3	5.8	7.6
30			6.9	10.2	10.8	5.8	9.9	8.1	6.6	6.2	5.6	7.5
31					11.5		8.7	8.4		6.0		7.8

NOTE.—Jan. 6 to Mar. 23, ice 1 to 2 feet thick. Mar. 30, river clear of ice. During December river completely frozen over, with ice of insufficient thickness to hold a person. Relation of gage height to discharge affected by ice about Jan. 1 to Mar. 29 and Dec. 2 to 31.

WAPSIPINICON RIVER AT STONE CITY, IOWA.

Location.—At the highway bridge at Stone City, Iowa, a short distance above the Chicago, Milwaukee & St. Paul Railway bridge, about 4 miles above the mouth of Buffalo Creek.

Records available.—August 19, 1903, to December 31, 1912.

Drainage area.—1,310 square miles.

Gage.—Chain, attached to bridge. On December 4, 1906, repairs to the bridge resulted in raising the gage box. Gage heights from that date to January 13, 1910, when the change was determined, have been corrected. Corrected gage heights for 1907, 1908, and 1909 were published in Water-Supply Paper 265.

Channel.—Slightly shifting, as indicated by discharge measurements in 1912.

Discharge measurements.—Made from upstream side of bridge.

Artificial control.—During the year there has been a power plant installed at Center City, about 20 miles above the station which may possibly cause some diurnal fluctuation at the gage.

Winter flow.—The relation between gage height and discharge is affected by heavy ice during December, January, February, and a portion of March. Ice forms from 1 to 2 feet in thickness.

Cooperation.—Gage heights furnished by Frank Dearborn, of Stone City, Iowa.

Discharge measurements of Wapsipinicon River at Stone City, Iowa, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 4	J. B. Hill	3.72	514
Nov. 9	S. B. Soulé	2.95	198

Daily gage height, in feet, of Wapsipinicon River at Stone City, Iowa, for 1912.

[Frank Dearborn, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	3.2	......	14.1	4.1	3.3	2.62	3.0	3.35	3.2	3.05	3.3
2	......	......	......	14.9	4.1	3.35	2.78	2.88	3.35	3.25	3.0	3.1
3	3.7	......	......	13.4	3.9	3.35	2.70	2.75	3.2	3.1	3.05	3.1
4	......	......	......	11.8	3.8	3.3	2.85	2.80	3.5	3.05	3.25	3.1
5	......	......	......	10.9	3.6	3.2	2.82	2.72	3.4	3.0	3.05	2.72
6	......	......	[a]4.8	10.0	3.7	3.3	2.88	2.85	3.4	2.88	3.0	2.94
7	......	3.6	......	9.2	3.6	3.15	2.58	2.80	3.5	2.96	3.0	3.2
8	......	......	......	8.3	3.5	3.1	2.62	2.85	3.95	2.85	2.90	3.2
9	......	......	......	7.5	3.45	3.45	2.82	2.87	3.0	3.3	3.0	3.15
10	......	......	......	7.5	3.3	3.05	2.72	2.87	3.05	3.65	2.98	3.2
11	3.2	......	......	6.9	3.65	2.98	2.85	2.60	3.3	3.9	3.0	3.2
12	......	......	......	6.5	4.0	2.95	2.85	2.62	3.15	3.75	2.96	3.15
13	......	......	[a]4.2	6.4	3.8	3.1	2.78	2.84	2.95	4.15	3.3	3.1
14	......	3.55	......	8.3	3.6	3.2	2.63	2.42	3.1	3.95	3.5	3.1
15	......	......	......	7.0	3.45	3.05	2.55	2.40	3.0	3.65	3.45	......
16	......	......	......	6.6	3.45	3.0	2.72	2.40	3.0	3.35	3.5	......
17	3.1	......	......	6.4	3.45	2.93	2.72	2.42	2.85	3.45	3.35	......
18	......	......	......	5.8	3.5	2.92	2.68	2.50	3.0	3.3	3.15	3.1
19	......	......	......	5.6	3.45	2.90	2.65	7.1	3.2	3.3	3.05	......
20	......	......	[a]3.9	5.1	3.65	2.87	2.65	6.7	3.35	3.25	3.1	......
21	......	3.5	......	5.0	3.6	2.95	2.88	6.1	3.6	3.3	3.1	......
22	......	......	......	4.8	3.5	2.97	2.53	5.2	3.55	3.25	3.0	......
23	......	......	6.2	4.7	3.4	2.97	2.45	4.5	3.45	3.1	3.0	......
24	3.15	......	[a]8.7	4.9	3.35	2.92	2.90	4.3	3.4	3.2	3.0	......
25	......	......	8.2	4.5	3.25	2.85	2.85	4.1	3.35	3.15	3.0	......
26	......	......	8.2	4.1	3.35	2.90	2.72	3.9	3.25	3.0	2.98	3.1
27	......	......	8.2	4.1	3.35	2.90	2.75	3.7	3.15	3.1	2.95	......
28	......	4.4	8.5	3.8	4.2	2.90	2.75	3.75	3.25	2.98	2.98	......
29	......	......	9.0	3.55	3.7	2.88	2.82	3.65	3.3	3.15	3.0	......
30	......	......	13.9	3.9	3.4	2.70	2.80	3.4	3.2	3.0	3.9	......
31	......	......	13.6	......	3.4	......	3.05	3.45	......	3.1	......	......

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Mar. 30, and about Dec. 7 to 31.

Daily discharge, in second-feet, of Wapsipinicon River at Stone City, Iowa, for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,300	710	335	119	220	355	295	238	335
2	10,400	710	355	159	185	355	315	220	255
3	8,320	610	355	138	151	295	255	238	255
4	6,340	560	335	177	164	420	238	315	255
5	5,430	465	295	169	143	375	220	238	143
6	4,640	510	335	185	177	375	185	220	202
7	4,000	465	275	110	164	420	208	220	....
8	3,320	420	255	119	177	635	177	190	....
9	2,730	398	398	169	182	220	335	220	....
10	2,730	335	238	143	182	238	488	214	....
11	2,320	488	214	177	114	335	610	220	....
12	2,060	660	205	177	119	275	535	208	....
13	2,000	560	255	159	174	205	738	335	....
14	3,320	465	295	121	78	255	635	420	....
15	2,380	398	238	103	74	220	488	398	....
16	2,120	398	220	143	74	220	355	420	....
17	2,000	398	199	143	78	177	398	355	....
18	1,640	420	196	133	92	220	335	275	....
19	1,540	398	190	126	2,450	295	335	238	....
20	1,260	488	182	126	2,180	355	315	255	....
21	1,200	465	205	185	1,820	465	335	255	....
22	1,100	420	211	99	1,320	442	315	220	....
23	1,040	375	211	83	930	398	255	220	....
24	1,150	355	196	190	820	375	295	220	....
25	930	315	177	177	710	355	275	220	....
26	710	355	190	143	610	315	220	214	....
27	710	355	190	151	510	275	255	205	....
28	560	765	190	151	535	315	214	214	....
29	442	510	185	169	488	335	275	220	....
30	610	375	138	164	375	295	220	610	....
31	....	375	....	238	398	....	255	....	....

NOTE.—Daily discharge computed from a rating curve fairly well defined. Daily discharge Jan. 1 to Mar. 30, and Dec. 7 to Dec. 31; estimated, because of ice, from climatologic records discharge of adjacent drainage areas and observer's reports, as follows: Jan. 1 to 31, 200 second-feet, varying from about 250 to 150 second-feet; Feb. 1 to 29, 150 second-feet; Mar 1 to 30, 990 second-feet, varying from about 200 to 8,000 second-feet; Dec. 7 to 31, 170 second-feet.

Monthly discharge of Wapsipinicon River at Stone City, Iowa, for 1912.

[Drainage area, 1,310 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	200	0.153	0.18	
February	....	....	150	.115	.12	
March	....	....	990	.756	.87	
April	10,400	442	2,880	2.20	2.46	B.
May	765	315	468	.357	.41	A.
June	398	138	242	.185	.21	A.
July	238	83	150	.115	.13	A.
August	2,450	74	506	.386	.44	B.
September	635	177	327	.250	.28	A.
October	738	177	335	.256	.30	A.
November	610	190	268	.205	.23	A.
December	....	....	184	.140	.16	
The year	10,400	....	556	.424	5.79	

NOTE.—See footnote to table of daily discharge.

ROCK RIVER BELOW MOUTH OF PECATONICA RIVER, AT ROCKTON, ILL.

Location.—At highway bridge 1 mile below dam and three-fourths of a mile below mouth of Pecatonica River.

Records available.—June 28, 1903, to July 20, 1906; October 1, 1906, to March 31, 1909. (A discharge measurement was made May 13, 1903.)

Drainage area.—6,290 square miles.

Gage.—Standard chain gage attached to downstream side of first span from left end of bridge. Datum raised 1.0 foot October 1, 1906, so that gage readings since that date are 1.0 foot less than they would have been by the former datum.

Control.—Practically permanent.

Discharge measurements.—Made from upstream side of 5-span bridge.

Floods.—The highest recorded stage during the period when the gage was in operation was 13.23 feet, in 1904. No other flood records available.

Winter flow.—Discharge relation affected by ice.

Regulation.—Low-water flow modified by operation of dam and power plant.

Diversions.—Some water diverted for small power plants.

Accuracy.—Amount of change in datum on October 1, 1906, only approximately known; estimates since that date liable to some error, probably small. Data were published in Water-Supply Paper 305 as originally recomputed for the 1911 report of the River and Lakes Commission of the State of Illinois. Tables of monthly discharge in Water-Supply Paper 305 are erroneous. Corrected tables are published in this report and in report of Rivers and Lakes Commission for 1911.

Monthly discharge of Rock River, below mouth of Pecatonica River, at Rockton, Ill., for 1903–1909.

[Drainage area, 6,290 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1903.					
July	12,000	2,100	5,630	0.895	1.03
August	5,760	3,030	4,270	.679	.78
September	9,020	3,870	5,600	.890	.99
October	9,020	3,030	4,820	.766	.88
November	3,530	2,100	2,810	.447	.50
December	....	....	2,150	.342	.39
1904.					
January	....	....	1,560	.248	.29
February	....	....	1,630	.259	.28
March	27,100	....	14,300	2.27	2.62
April	20,600	5,820	10,800	1.72	1.92
May	6,600	4,200	5,420	.862	.99
June	4,010	1,620	2,510	.399	.45
July	2,100	1,160	1,660	.264	.30
August	3,030	950	1,550	.246	.28
September	4,960	1,560	2,420	.385	.43
October	5,550	2,180	3,130	.498	.57
November	2,320	1,690	1,930	.307	.34
December	....	....	1,850	.294	.34
The year	27,100	....	4,070	.647	8.81
1905.					
January	....	....	2,170	.345	.40
February	....	....	1,780	.283	.29
March	22,500	....	12,700	2.02	2.33
April	19,300	4,770	10,100	1.61	1.80
May	12,300	3,530	6,770	1.08	1.24
June	7,540	4,960	6,490	1.03	1.15
July	5,150	2,550	3,970	.631	.73
August	3,360	2,030	2,620	.417	.48
September	4,310	1,820	2,720	.432	.48
October	5,150	1,320	2,490	.396	.46
November	3,110	2,100	2,550	.405	.45
December	5,760	1,820	2,800	.445	.51
The year	22,500	....	4,780	.760	10.32

Monthly discharge of Rock River, below mouth of Pecatonica River, at Rockton, Ill., for 1903–1909—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1906.					
January	18,100	2,630	9,610	1.53	1.76
February	....	....	9,900	1.57	1.64
March	21,900	5,150	12,500	1.99	2.29
April	15,800	4,980	9,160	1.46	1.63
May	4,860	2,630	3,650	.580	.67
June	3,360	1,820	2,380	.378	.42
July 1–20	3,360	1,820	2,410	.383	.28
October	2,400	1,380	1,720	.273	.31
November	6,400	1,560	2,630	.418	.47
December	5,060	2,030	3,320	.528	.61
1907.					
January 1–28	....	....	6,940	1.10	1.14
February 18–28	....	....	6,510	1.03	.42
March	10,600	3,360	4,820	.766	.88
April	12,300	4,580	7,420	1.18	1.32
May	5,760	2,550	4,020	.639	.74
June	8,270	3,360	5,230	.831	.93
July	11,100	2,870	5,960	.948	1.09
August	5,550	2,870	3,980	.633	.73
September	9,900	1,760	4,490	.714	.80
October	9,400	2,710	4,460	.709	.82
November	3,360	2,030	2,600	.413	.46
1908.					
January	....	....	2,330	.370	.43
February	....	....	6,620	1.05	1.13
March	15,800	6,440	10,900	1.73	1.99
April	10,400	4,580	6,720	1.07	1.19
May	11,900	7,070	9,090	1.45	1.67
June	8,900	3,280	6,410	1.02	1.14
July	6,400	2,070	3,530	.561	.65
August	2,480	1,500	1,810	.288	.33
September	1,620	1,380	1,470	.234	.26
October	1,720	1,380	1,510	.240	.28
November	2,400	1,320	1,720	.273	.30
December	2,790	1,560	2,110	.335	.39
The year	15,800	....	4,510	.717	9.76
1909.					
January	....	....	4,010	.638	.74
February	13,700	....	7,510	1.19	1.24
March	12,200	5,450	8,590	1.37	1.58

IOWA RIVER NEAR IOWA FALLS, IOWA.

Location.—About 1 mile above Iowa Falls and 2 miles below the Northwestern Railway bridge.

Records available.—August 5, 1911, to December 31, 1912.

Gage.—Vertical staff fastened to a maple tree on the left bank of the river.

Channel.—Rock bottom—permanent.

Discharge measurements.—Made at low water by wading in the vicinity of the gage—at other stages made from bridge.

Winter flow.—Relation of gage height to discharge is affected by ice.

Artificial control.—There is a dam 7 miles above the gage at Alden, which is used occasionally. It is thought that the flow at the gage is the natural flow of the stream.

Accuracy.—Sufficient discharge data have not been obtained to permit estimates of flow.

Discharge measurements of Iowa River near Iowa Falls, Iowa, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 7	Lees and Soulé	0.61	28.1
7	do	.61	30.2

Note.—Measurements made by wading.

Daily gage height, in feet, of Iowa River near Iowa Falls, Iowa, for 1912.

[Albert Kulas, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.90	0.76	1.01	4.6	1.22	1.50	0.82	0.65	0.64	0.56	0.85	0.85
2	.88	.68	1.01	4.0	1.16	1.42	.92	.64	.80	.72	.86	.85
3	.80	.74	1.10	3.4	1.14	1.28	.88	.61	.79	.60	.85	.74
4	.85	.60	1.18	2.75	1.10	1.20	.85	.60	.74	.60	.92	.88
5	.70	.60	1.20	2.4	1.10	1.12	.85	.60	.69	.62	.82	.98
6	.72	.75	1.20	2.2	1.10	1.10	.78	.60	.69	.62	.72	1.00
7	.70	.84	1.15	2.0	1.09	1.06	.76	.60	.65	.62	.68	1.00
8	.71	.80	1.15	1.85	1.09	1.00	.79	.66	.68	.72	.90	.94
9	.79	.74	1.15	1.65	1.08	.96	.78	.65	.68	.65	.76	.95
10	.78	.65	1.14	1.50	1.08	.90	.79	.66	.79	.71	.78	.80
11	.69	.70	1.10	1.42	1.35	.89	.79	.71	.66	.78	.72	.82
12	.69	.65	1.15	1.36	2.1	.86	.90	.90	.58	.72	.79	.80
13	.62	.68	1.11	1.30	1.65	1.12	.88	.86	.71	1.05	.81	.85
14	.61	.76	1.20	1.90	1.49	1.22	.88	.88	.72	1.00	.82	.85
15	.65	.71	.91	2.15	1.40	1.48	.78	.80	.61	1.00	.84	.86
16	.62	.70	1.15	1.85	1.30	1.24	.74	.78	.76	.94	.82	.90
17	.61	.76	1.12	1.65	1.25	1.18	.70	.75	.70	.89	.85	.88
18	.70	.80	1.22	1.49	1.19	1.10	.70	.75	.58	.84	.72	.89
19	.74	.78	1.84	1.35	1.12	1.02	.80	.79	.78	.80	.66	.90
20	.70	.78	1.95	1.30	1.10	.99	1.01	.82	.72	.81	.82	.90
21	.75	.84	1.74	1.38	1.06	.92	1.12	.82	.64	.90	.81	.92
22	.68	.75	1.70	1.65	1.01	.90	1.10	.82	.69	1.05	.84	.94
23	.68	.85	1.61	1.69	1.00	.89	1.01	.79	.74	1.00	.88	.91
24	.80	1.02	1.55	1.66	.94	.86	.94	.78	.69	.98	.75	.92
25	.78	1.01	2.55	1.55	.90	.82	.85	.75	.62	.98	.82	.90
26	.80	.99	3.0	1.39	.95	.80	.85	.71	.62	.94	.69	.90
27	.75	.91	3.9	1.28	1.70	.78	.75	.72	.68	.90	.56	.92
28	.70	.90	4.3	1.32	2.2	.78	.72	.69	.72	.90	.72	.95
29	.61	.91	[a]10.0	1.30	2.1	.75	.70	.68	.58	.88	.90	.92
30	.64	......	[a]10.5	1.30	1.74	.75	.70	.66	.74	.88	.78	.95
31	.70	......	5.2	......	1.50	......	.66	.65	......	.85	......	.99

Note.—Relation of gage height to discharge probably affected by ice Jan. 1 to Mar. 28, and Dec. 8 to Dec. 31. Gage observer reported that ice broke at 1.30 p. m. Mar. 28, forming a gorge one-half mile below the gage, backing up the ice and water so as to make it impossible to reach the gage until Mar. 30. Gage height Mar. 29 and 30 estimated by observer.

CEDAR RIVER NEAR AUSTIN, MINN.

Location.—Just below the dam of the Red Cedar Mill, 2 miles below Austin in sec. 15, T. 102 N., R. 18 W.

Records available.—May 29, 1909, to December 31, 1912.

Drainage area.—425 square miles.

Gage.—May 29, 1909, to May 1, 1912, staff gage located in the tail race. May 2, 1912, to December 31, 1912, chain gage located on bridge a short distance below the power house.

Winter flow.—The relation between stage and discharge is somewhat affected by ice. The discharge during the period of ice is estimated from discharge measurements.

Artificial control.—Immediately above the station is the water power plant known as Red Cedar Mill. During the low-water season the water is drawn down below the crest of the dam by the end of the 10 or 12 hour run, and after the turbine is closed the water is held back for several hours before it has risen sufficiently to flow over the crest. Consequently, the stage of the river changes considerably during each 24 hours. In order to get a mean gage height, the gage is read five times daily as follows: Before the turbine is started in the morning, one hour after starting, at noon, just before shutting down at night, and one-half hour later. It is believed that the monthly mean discharge represents very nearly the natural flow.

Accuracy.—Owing to the slightly shifting channel and fluctuations caused by power house, records are only fair.

Discharge measurements on Cedar River near Austin, Minn., in 1912.

[Referred to staff gage.]

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 5[a]	W. G. Hoyt	5.01	107	Mar. 29	C. J. Emerson	10.96	3,000
Feb. 17[a]	S. B. Soulé	4.87	131	30	.....do	12.32	4,060
17	.....do	4.86	131	May 1[b]	S. B. Soulé	5.06	182

[a] Made from bridge and ice. Partial ice cover. Open at gage.
[b] First measurement after installation of chain gage.

[Referred to chain gage.]

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 1[a]	S. B. Soulé	3.03	182
Sept. 6[b]	.....do	2.11	7.8
6[b]	.....do	2.11	7.1

[a] First measurement after installation of chain gage.
[b] About 200 feet above gage by wading. Flow being held back by dam.

Daily gage height, in feet, at staff gage on Cedar River near Austin, Minn., for 1912.

[J. C. King, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Jan.	Feb.	Mar.	Apr.	May.
1	4.15	3.60	3.75	8.4	4.95	16	4.95	3.70	4.25	6.3	....
2	4.55	4.75	4.45	7.5	....	17	4.85	4.55	3.65	5.7	....
3	4.5	4.5	3.60	6.6	....	18	4.65	3.80	4.5	5.5	....
4	4.45	3.70	4.40	6.1	....	19	4.5	4.30	5.15	5.25	....
5	3.75	4.65	4.35	6.1	....	20	4.65	4.45	5.55	5.0	....
6	4.85	4.6	4.30	6.6	....	21	3.65	4.15	5.55	6.0	....
7	4.10	3.65	3.55	7.5	....	22	4.25	4.40	5.2	8.8	....
8	4.6	4.6	4.35	6.5	....	23	4.6	4.30	5.1	7.4	....
9	4.7	4.5	4.35	5.7	....	24	4.6	4.35	4.95	5.9	....
10	4.5	4.35	3.65	5.5	....	25	4.45	3.75	5.0	5.4	....
11	4.6	3.75	4.30	5.4	....	26	4.35	4.35	5.05	5.3	....
12	4.45	4.55	4.35	5.3	....	27	4.35	4.40	7.8	5.3	....
13	4.85	4.5	4.30	5.4	....	28	3.70	3.65	12.6	4.95	....
14	4.10	3.80	3.60	7.4	....	29	4.35	4.40	11.9	5.1	....
15	4.8	4.55	4.30	7.6	....	30	4.5	....	9.3	5.05	....
						31	4.55	....	8.8	....	....

NOTE.—Jan. 6, observer reported backwater from ice.

Daily discharge, in second-feet, of Cedar River near Austin, Minn., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1	63	9	11	1,660	16	144	16	44	645
2	132	76	64	1,200	17	111	77	7.5	408
3	111	52	6	770	18	76	13	70	332
4	102	12	58	565	19	52	48	210	242
5	26	70	53	565	20	70	64	351	166
6	35	63	48	770	21	11	35	351	525
7	44	12	5	1,200	22	31	58	225	1,880
8	111	70	53	727	23	58	48	194	1,150
9	122	58	53	408	24	52	53	154	486
10	84	44	7.5	332	25	40	11	166	295
11	92	16	48	295	26	34	53	180	259
12	70	70	53	259	27	34	58	1,350	259
13	132	63	48	295	28	10	7.5	4,180	154
14	34	18	6	1,150	29	34	58	3,720	194
15	111	76	48	1,250	30	48	....	2,150	180
					31	52	....	1,880	....

NOTE.—Daily discharge computed from a rating table well defined between 84 and 4,440 second-feet (gage heights 4.6 and 13.0 feet). Rating table applied indirectly Jan. 1 to Feb. 16. Jan. 6, discharge interpolated because of backwater from ice.

Daily gage height at chain gage, in feet, of Cedar River near Austin, Minn., for 1912.

[J. C. King, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	2.7	2.44	2.53	....	2.11	2.45	2.43
2	2.8	2.7	2.62	2.70	....	2.47	2.46	2.36
3	2.75	2.6	2.18	2.42	....	2.47	2.33	2.36
4	2.8	2.6	2.69	2.81	....	2.48	2.40	2.42
5	2.75	2.65	2.22	2.61	....	2.49	2.42	2.42
6	2.85	2.65	2.51	2.39	2.11	2.33	2.48	2.34
7	2.8	2.65	2.53	2.47	2.20	2.37	2.43	2.34
8	2.8	2.6	2.41	2.22	2.39	2.42	2.46	2.30
9	2.75	2.5	2.08	2.47	2.73	2.44	2.44	2.47
10	2.65	2.15	6.9	2.71	2.22	2.42	2.31	2.42
11	2.65	2.6	5.6	2.56	2.67	2.52	2.38	2.23
12	2.5	2.6	4.65	2.63	2.69	2.60	2.52	2.27
13	2.65	2.6	4.65	2.44	2.58	2.43	2.66	2.24
14	2.65	2.6	4.10	2.67	2.52	2.69	2.65	2.21
15	2.65	2.65	3.90	2.59	2.50	2.59	2.66	2.08
16	2.65	2.55	3.65	2.23	2.47	2.53	2.64	2.35
17	2.55	2.7	3.40	2.76	2.48	2.51	2.48	2.47
18	2.6	2.65	3.25	2.61	2.57	2.51	2.58	2.44
19	2.45	2.6	3.15	2.74	2.54	2.46	2.56	2.41
20	2.6	2.6	3.30	2.64	2.48	2.32	2.56	2.27
21	2.6	2.6	3.50	2.68	2.54	2.55	2.57	2.20
22	2.6	2.6	3.50	2.65	2.36	2.56	2.48	2.00
23	4.5	2.4	3.30	2.60	2.36	2.49	2.50	2.39
24	4.6	2.5	3.15	2.19	2.41	2.45	2.33	2.26
25	3.65	2.7	3.00	2.86	2.23	2.49	2.53	2.11
26	3.25	2.0	2.97	2.34	1.95	2.44	2.52	2.35
27	3.25	2.8	2.62	....	2.62	2.36	2.54	2.30
28	3.15	2.1	2.87	....	1.99	2.42	2.37	2.22
29	2.95	2.4	2.49	....	2.04	2.44	2.52	1.97
30	2.75	2.55	2.92	....	2.10	2.42	2.58	2.25
31	2.75	....	2.64	....	....	2.47	....	2.37

NOTE.—No record obtained Aug. 27 to Sept. 5 because chain gage was removed in making repairs to bridge. Dec. 9 and 10, increase in gage height probably due to ice.

Daily discharge, in second-feet, of Cedar River near Austin, Minn., for 1912.

[From chain gage record.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a] 154	100	46	62	18	7.5	48	45
2	125	100	81	100	16	51	50	34
3	112	76	13	43	14	51	30	34
4	125	76	98	128	12	53	40	43
5	112	88	17	78	10	54	43	43
6	138	88	58	38	7.5	30	53	31
7	125	88	62	51	15	36	45	31
8	125	76	42	17	38	43	50	25
9	112	56	6.3	51	108	46	46	23
10	88	11	1,800	102	17	43	26	21
11	88	76	1,070	68	93	60	37	18
12	56	76	670	83	98	76	60	22
13	88	76	670	46	72	45	90	19
14	88	76	490	93	60	98	88	16
15	88	88	428	74	56	74	90	6.3
16	88	66	353	18	51	62	86	32
17	66	100	282	115	53	58	53	51
18	76	88	241	78	70	58	72	46
19	48	76	215	110	64	50	68	42
20	76	76	254	86	53	28	68	22
21	76	76	310	95	64	66	70	15
22	76	76	310	88	34	68	53	4.5
23	618	40	254	76	34	54	56	38
24	652	56	215	14	42	48	30	21
25	353	100	176	140	18	54	62	7.5
26	241	4.5	168	31	4.0	46	60	32
27	241	125	81	29	81	34	64	25
28	215	6.7	142	27	4.4	43	36	17
29	163	40	54	24	5.4	46	60	4.2
30	112	66	155	22	6.7	43	72	20
31	112	....	86	20	....	51	....	36

[a] From staff gage record.

NOTE.—Daily discharge Aug. 27 to Sept. 5 and Dec. 9 and 10 interpolated. Daily discharge computed from a rating curve fairly well defined between 6.7 and 1,020 second-feet (gage heights 2.1 and 5.5 feet). Four discharge measurements made during 1913 (before the preparation of this report) were used to determine this rating curve.

Monthly discharge of Cedar River near Austin, Minn., for 1912.[a]

[Drainage area, 425 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	144	10	68.6	0.161	0.19	C.
February	77	7.5	45.1	.106	.11	C.
March	4,180	5	509	1.20	1.38	B.
April	1,880	154	621	1.46	1.63	B.
May	652	48	156	.367	.42	B.
June	125	4.5	71.6	.168	.19	B.
July	1,800	6.3	285	.671	.77	C.
August	140	14	64.7	.152	.18	C.
September	108	4.0	40.6	.096	.11	C.
October	98	7.5	50.9	.120	.14	B.
November	90	26	56.9	.134	.15	B.
December	51	4.2	26.6	.063	.07	C.
The year	4,180	4.2	[a] 167	.393	5.34	

[a] January, February, March, and April from staff gage records; remainder from chain gage records.

CEDAR RIVER AT CEDAR RAPIDS, IOWA.

Location.—In the central part of Cedar Rapids, below the dam and between the electric railroad bridge and the Seventh Avenue combination railroad and foot bridge.

Records available.—October 26, 1902, to December 31, 1912.

Drainage area.—6,320 square miles.

Gage.—An inclined staff gage reading from 0 to 15 feet, fastened to posts driven in the right bank of the river in the rear of the Iowa Windmill & Pump Co.'s plant.

Channel.—Rock and gravel; clean of vegetation and nearly permanent.

Discharge measurements.—Made from the upstream side of the First Avenue bridge.

Artificial control.—A dam and power plant above the station may modify the flow to some extent during low stage of the river.

Winter flow.—The gage is located where the current is swift and ice seldom forms across the river for the entire width. The relation therefore between the gage and the discharge is affected only slightly by ice.

Discharge measurements of Cedar River at Cedar Rapids, Iowa, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 21	J. B. Hill	4.25	3,910
Nov. 8	S. B. Soulé	3.01	910

Daily gage height, in feet, of Cedar River at Cedar Rapids, Iowa, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	3.4	3.8	17.2	4.4	3.7	3.0	3.1	3.2	3.1	3.1	3.0
2	3.6	......	3.9	16.3	4.3	3.8	3.1	3.2	3.3	3.2	3.0	2.9
3	......	......	3.9	12.9	4.3	3.6	3.0	3.2	3.2	3.1	3.1	3.1
4	......	3.5	4.0	10.7	4.1	3.7	3.1	3.1	3.3	3.2	3.0	2.8
5	3.7	......	3.8	8.9	4.1	3.6	3.0	3.1	3.3	3.1	3.0	2.9
6	......	......	3.8	7.5	4.0	3.7	3.1	3.0	3.4	3.2	2.9	2.7
7	3.6	3.4	3.7	6.7	4.2	3.5	3.0	3.1	3.2	3.1	3.2	2.8
8	......	......	3.9	6.1	4.0	3.6	3.1	3.0	3.3	3.2	3.0	2.8
9	3.8	......	3.8	5.8	4.1	3.4	3.0	3.1	3.2	3.2	3.1	2.9
10	......	3.5	3.8	5.7	3.9	3.5	3.0	3.1	3.3	3.5	2.9	3.0
11	......	......	3.7	5.6	4.0	3.4	2.9	3.3	3.2	3.4	3.0	3.1
12	3.8	......	3.8	5.3	4.0	3.4	3.1	3.1	3.2	3.4	2.9	3.0
13	......	3.3	3.7	5.3	4.0	3.2	3.0	3.2	3.1	3.3	3.1	3.1
14	......	......	3.9	5.1	3.9	3.3	3.2	3.0	3.2	3.3	3.2	3.2
15	3.7	3.6	3.8	5.1	4.1	3.5	3.2	3.1	3.2	3.2	3.4	2.8
16	......	......	4.0	5.0	4.0	3.5	3.5	3.0	3.3	3.3	3.2	2.7
17	......	3.6	4.0	5.3	4.1	3.3	3.7	3.2	3.2	3.1	3.2	2.8
18	3.6	......	4.4	5.9	4.1	3.4	3.6	3.1	3.4	3.2	3.0	2.8
19	......	3.9	5.1	5.5	4.2	3.3	3.4	3.8	3.3	3.1	3.1	2.9
20	3.9	......	5.5	5.2	4.2	3.4	3.5	4.2	3.3	3.2	3.0	2.8
21	......	3.7	5.7	5.0	4.1	3.3	3.5	3.9	3.2	3.1	3.1	2.9
22	3.8	......	6.7	4.6	3.8	3.4	3.7	3.6	3.3	3.1	2.9	2.8
23	......	......	6.3	4.7	3.8	3.2	3.6	3.6	3.2	3.0	3.0	2.9
24	......	4.6	6.5	4.5	3.7	3.3	3.6	3.5	3.3	3.1	2.9	2.7
25	3.7	4.9	6.1	5.0	4.0	3.2	3.5	3.5	3.2	3.1	2.9	2.8
26	......	4.6	5.9	5.2	3.9	3.2	3.6	3.4	3.2	3.2	2.8	2.7
27	3.7	4.5	6.5	5.1	4.3	3.1	3.5	3.5	3.1	3.1	2.9	2.9
28	......	4.0	8.3	4.8	4.0	3.2	3.5	3.3	3.2	3.2	2.9	2.8
29	......	3.9	9.5	4.6	3.9	3.0	3.3	3.3	3.2	3.1	3.0	3.0
30	3.6	......	11.1	4.5	3.8	3.1	3.4	3.3	3.2	3.1	2.9	2.9
31	......	......	15.7	......	3.9	......	3.2	3.4	......	3.0	......	3.1

NOTE.—Ice was reported at the gage Jan. 1 to Feb. 23, but the effect on the relation of gage height to discharge was probably small.

Daily discharge, in second-feet, of Cedar River at Cedar Rapids, Iowa, for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a]1,850	1,630	2,590	54,100	4,430	2,320	950	1,100	1,260	1,100	1,100	950
2	2,070	[a]1,700	2,870	50,600	4,110	2,590	1,100	1,260	1,440	1,260	950	810
3	[a]2,150	[a]1,770	2,870	37,200	4,110	2,070	950	1,260	1,260	1,100	1,100	1,100
4	[a]2,230	1,840	3,170	28,500	3,480	2,320	1,100	1,100	1,440	1,260	950	690
5	2,320	[a]1,770	2,590	21,400	3,480	2,070	950	1,100	1,440	1,100	950	810
6	[a]2,200	[a]1,700	2,590	15,800	3,170	2,320	1,100	950	1,630	1,260	810	580
7	2,070	1,630	2,320	12,700	3,790	1,840	950	1,100	1,260	1,100	1,260	690
8	[a]2,330	[a]1,700	2,870	10,400	3,170	2,070	1,100	950	1,440	1,260	950	690
9	2,590	[a]1,770	2,590	9,340	3,480	1,630	950	1,100	1,260	1,260	1,100	810
10	[a]2,590	1,840	2,590	8,970	2,870	1,840	950	1,100	1,440	1,840	810	950
11	[a]2,590	[a]1,710	2,320	8,610	3,170	1,630	810	1,440	1,260	1,630	950	1,100
12	2,590	[a]1,580	2,590	7,530	3,170	1,630	1,100	1,100	1,260	1,630	810	950
13	[a]2,500	1,440	2,320	7,530	3,170	1,260	950	1,260	1,100	1,440	1,100	1,100
14	[a]2,410	[a]1,570	2,870	6,820	2,870	1,440	1,260	950	1,260	1,440	1,260	1,260
15	2,320	2,070	2,590	6,820	3,480	1,840	1,260	1,100	1,260	1,260	1,630	690
16	[a]2,230	[a]2,070	3,170	6,470	3,170	1,840	1,840	950	1,440	1,440	1,260	580
17	[a]2,150	2,070	3,170	7,530	3,480	1,440	2,320	1,260	1,260	1,100	1,260	690
18	2,070	[a]2,470	4,430	9,710	3,480	1,630	2,070	1,100	1,630	1,260	950	690
19	[a]2,470	2,870	6,820	8,250	3,790	1,440	1,630	2,590	1,440	1,100	1,100	810
20	2,870	[a]2,600	8,250	7,170	3,790	1,630	1,840	3,790	1,440	1,260	950	690
21	[a]2,730	2,320	8,970	6,470	3,480	1,440	1,840	2,870	1,260	1,100	1,100	810
22	2,590	[a]3,240	12,700	5,090	2,590	1,630	2,320	2,070	1,440	1,100	810	690
23	[a]2,500	[a]4,160	11,200	5,430	2,590	1,260	2,070	2,070	1,260	950	950	810
24	[a]2,410	5,090	12,000	4,760	2,320	1,440	2,070	1,840	1,440	1,100	810	580
25	2,320	6,120	10,400	6,470	3,170	1,260	1,840	1,840	1,260	1,100	810	690
26	[a]2,320	5,090	9,710	7,170	2,870	1,260	2,070	1,630	1,260	1,260	690	580
27	2,320	4,760	12,000	6,820	4,110	1,100	1,840	1,840	1,100	1,100	810	810
28	[a]2,230	3,170	19,000	5,770	3,170	1,260	1,840	1,440	1,260	1,260	810	690
29	[a]2,150	2,870	23,700	5,090	2,870	950	1,440	1,440	1,260	1,100	950	950
30	2,070	....	30,000	4,760	2,590	1,100	1,630	1,440	1,260	1,100	810	810
31	[a]1,850	....	48,200	....	2,870	....	1,260	1,630	....	950	....	1,100

[a] Daily discharge interpolated.

NOTE.—Daily discharge computed from a rating curve well defined between 600 and 36,000 second-feet. Open-channel rating table applied throughout entire year. Values in January and February should be used with caution. See footnote to table of daily gage height.

Monthly discharge of Cedar River at Cedar Rapids, Iowa, for 1912.

[Drainage area, 6,320 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	2,870	1,850	2,330	0.369	0.43	(a)
February	6,120	1,440	2,570	.407	.44	(a)
March	48,200	2,320	8,500	1.34	1.54	B.
April	54,100	4,760	12,800	2.03	2.26	B.
May	4,430	2,320	3,300	.522	.60	A.
June	2,590	950	1,650	.261	.29	A.
July	2,320	810	1,460	.231	.27	A.
August	3,790	950	1,510	.239	.28	A.
September	1,630	1,100	1,330	.210	.23	A.
October	1,840	950	1,230	.195	.22	A.
November	1,630	690	993	.157	.18	A.
December	1,260	580	812	.128	.15	B.
The year	54,100	580	3,200	.506	6.89	

[a] Error due to possible effect of ice during January and February not known. Use discharge values with due caution.

DES MOINES RIVER AT JACKSON, MINN.

Location.—At highway bridge one-half mile below the dam at Jackson, 100 yards above the nearest tributary, a small stream entering from the west.

Records available.—May 31, 1909, to December 5, 1912.

Drainage area.—1,160 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Shifting during periods of high water; probably permanent during low water.

Discharge measurements.—Made from the bridge and by wading.

Winter flow.—Observations are discontinued from December to March because of ice.

Artificial control.—At the dam one-half mile above the station there is a power plant that develops 35 horsepower under a head of 6½ feet. The plant is operated only six hours a day on the average, but the morning and evening gage heights thus far obtained do not show any appreciable change in the stage of the river in the low-water season, owing to water being held back after the turbines have been shut down.

Discharge measurements of Des Moines River at Jackson, Minn., in 1912.

[S. B. Soulé, hydrographer.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 2	4.26	211	Sept. 7[a]	2.86	4.6
2	4.24	200	7[a]	2.86	5.4
Sept. 7[a]	2.86	5.1			

[a] Measurement made by wading at section about 200 feet below gage.

NOTE.—Zero flow determined to be at gage height 1.8 feet, Sept. 7, 1912.

Daily gage height, in feet, of Des Moines River at Jackson, Minn., for 1912.

[Albert Strobel, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.0	4.3	3.5	2.80	2.72	2.90	2.80	2.78	3.0
2	5.1	4.2	3.4	2.79	2.72	2.95	2.80	2.95	2.98
3	5.5	4.2	3.3	2.88	2.72	2.95	2.78	2.95	2.89
4	5.0	4.15	3.4	3.0	2.72	2.94	2.75	2.90	2.81
5	4.7	4.15	3.35	3.0	2.75	2.90	2.76	2.91	2.80
6	4.7	4.2	3.3	2.92	2.76	2.88	2.76	2.91	....
7	4.6	4.2	3.25	2.95	2.82	2.85	2.75	2.91	....
8	4.6	4.1	3.2	3.0	4.1	2.85	2.75	2.89	....
9	4.5	4.05	3.15	2.91	3.3	2.85	2.91	2.88	....
10	4.5	4.0	3.0	2.98	3.1	2.85	3.25	2.89	....
11	4.45	4.05	3.2	3.0	3.0	2.85	3.1	2.90	....
12	4.4	3.95	3.1	2.95	3.0	2.85	3.05	2.95	....
13	4.5	3.9	3.1	2.86	2.96	2.85	3.0	2.98	....
14	4.7	3.9	3.1	2.82	2.92	2.85	2.98	3.0	....
15	4.7	3.9	3.15	2.78	2.91	2.82	2.94	2.96	....
16	4.6	3.85	3.15	2.78	2.89	2.80	3.0	2.95	....
17	4.5	3.8	3.05	2.78	2.90	2.81	3.3	2.95	....
18	4.4	3.8	3.1	2.78	2.90	2.85	3.10	2.92	....
19	4.4	3.8	3.05	2.88	3.6	2.85	2.99	2.96	....
20	4.3	3.75	3.0	2.96	3.2	2.85	2.92	2.96	....
21	5.0	3.75	3.0	2.90	3.15	2.84	2.89	2.90	....
22	5.0	3.7	3.0	2.84	3.0	2.85	2.85	2.90	....
23	4.8	3.7	3.0	2.82	2.98	2.82	2.85	2.90	....
24	4.6	3.6	3.0	2.78	2.92	2.79	2.82	2.96	....
25	4.5	3.65	2.88	2.75	2.90	2.81	2.80	2.88	....
26	4.6	3.6	2.98	2.74	2.88	2.81	2.81	3.0	....
27	4.5	3.5	2.96	2.72	2.84	2.82	2.80	3.1	....
28	4.45	3.65	2.85	2.72	2.81	2.82	2.80	3.0	....
29	4.4	3.55	2.82	2.72	2.80	2.86	2.80	2.98	....
30	4.3	3.5	2.80	2.75	2.88	2.86	2.79	2.98	....
31	....	3.5	....	2.75	2.89	....	2.78	....	....

Daily discharge, in second-feet, of Des Moines River at Jackson, Minn., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	362	214	80	5	4.2	9	5	4.8	18
2	385	195	66	4.9	4.2	14	5	14	16
3	479	195	54	8.2	4.2	14	4.8	14	8.6
4	362	186	66	18	4.2	13	4.5	9.0	5.4
5	296	186	60	18	4.5	9	4.6	9.9	5.0
6	296	195	54	11	4.6	8.2	4.6	9.9	....
7	275	195	48	14	5.8	7	4.5	9.9	....
8	275	176	42	18	176	7	4.5	8.6	....
9	254	167	36	9.9	54	7	9.9	8.2	....
10	254	158	18	16	30	7	48	8.6	....
11	244	167	42	18	18	7	30	9.0	....
12	234	149	30	14	18	7	24	14	....
13	254	140	30	7.4	14	7	18	16	....
14	296	140	30	5.8	11	7	16	18	....
15	296	140	36	4.8	9.9	5.8	13	14	....
16	275	132	36	4.8	8.6	5	18	14	....
17	254	123	24	4.8	9	5.4	54	14	....
18	234	123	30	4.8	9	7	30	11	....
19	234	123	24	8.2	94	7	17	14	....
20	214	116	18	14	42	7	11	14	....
21	362	116	18	9	36	6.6	8.6	9.0	....
22	362	108	18	6.6	18	7	7.0	9.0	....
23	317	108	18	5.8	16	5.8	7.0	9.0	....
24	275	94	18	4.8	11	4.9	5.8	14	....
25	254	101	8.2	4.5	9	5.4	5.0	8.2	....
26	275	94	16	4.4	8.2	5.4	5.4	18	....
27	254	80	14	4.2	6.6	5.8	5.0	30	....
28	244	101	7	4.2	5.4	5.8	5.0	18	....
29	234	87	5.8	4.2	5	7.4	5.0	16	....
30	214	80	5	4.5	8.2	7.4	4.9	16	....
31	....	80	....	4.5	8.6	....	4.8	....	....

NOTE.—Daily discharge computed from a fairly well defined rating curve.

Monthly discharge of Des Moines River at Jackson, Minn., for 1912.

[Drainage area, 1,160 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
April	479	214	285	0.246	0.27	B.
May	214	80	138	.119	.14	B.
June	80	5	31.7	.027	.03	B.
July	18	4.2	8.59	.0074	.009	C.
August	176	4.2	21.2	.018	.02	C.
September	14	4.9	7.40	.0064	.007	C.
October	54	4.5	12.6	.011	.01	C.
November	30	4.8	12.7	.011	.01	C.

DES MOINES RIVER NEAR FORT DODGE, IOWA.

Location.—At the upper highway bridge 1 mile upstream from Fort Dodge and just above the Illinois Central Railroad bridge, about 1 mile above the old Swede Town bridge at which the station was maintained during 1905–1906. The original bridge has been torn down and the new structure about 15 feet higher, which has been put in its place, was found to be unsuited for a gaging station.

Records available.—April 23, 1905, to July 19, 1906; August 4, 1911, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Chain, fastened to the outside handrail, downstream side of right span; datum unchanged.

Channel.—Bed composed of sand and gravel; considered practically permanent. One channel at all stages broken only by the bridge pier.

Winter flow.—Ice may affect the relation of gage height to discharge during December, January, and February.

Accuracy.—The relation between gage height and discharge may at times be affected by backwater from Lizard Creek. Sufficient discharge measurements have not been made to develop the discharge rating curve above 1,500 second-feet; therefore estimates of discharge above that point are not published.

Discharge measurements of Des Moines River near Fort Dodge, Iowa, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 27	J. B. Hill	2.62	1,020
Nov. 6[a]	S. B. Soulé	1.32	102
6[a]	....do	1.19	71.5

[a] Measurement made by wading.

Daily gage height, in feet, of Des Moines River near Fort Dodge, Iowa, for 1912.

[Ole C. Hanson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1				7.0	2.6	2.6	1.20	1.20	1.30	1.30	1.30
2				6.4	2.55	2.6	1.30	1.25	1.30	1.30	1.40
3				5.8	2.5	2.45	1.32	1.20	1.25	1.22	1.42
4				5.0	2.5	2.4	1.35	1.15	1.20	1.30	1.40
5				4.3	3.9	2.15	1.40	1.02	1.08	1.20	1.30
6				3.4	4.0	2.1	1.42	1.10	1.30	1.30	1.22
7	1.60			3.6	3.7	2.1	1.38	1.10	1.30	1.15	1.22
8	1.60			3.4	3.3	2.0	1.35	1.30	1.25	1.25	1.20
9	1.58			3.4	3.0	1.90	1.30	1.25	1.20	1.20	1.20
10	1.58			3.0	2.8	1.75	1.20	1.10	1.28	1.20	1.22
11	1.55			2.9	3.1	1.80	1.35	1.18	1.35	1.15	1.22
12	1.52			2.75	2.95	1.75	1.40	1.30	1.30	1.50	1.25
13	1.50			2.5	2.8	1.75	1.45	1.42	1.30	1.35	1.30
14	1.50			2.4	2.7	1.90	1.40	1.40	1.25	1.40	1.35
15	1.50			2.35	2.2	2.3	1.35	1.30	1.25	1.30	1.40
16	1.50			2.3	2.2	2.25	1.30	1.42	1.32	1.40	1.42
17	1.50			2.3	2.2	2.2	1.30	1.40	1.30	1.32	1.45
18	1.50			2.35	2.15	1.80	1.25	1.40	1.30	1.40	1.42
19	1.50			2.3	2.1	1.80	1.20	1.60	1.32	1.40	1.40
20	1.50			2.3	2.25	1.68	1.40	1.85	1.20	1.42	1.40
21				2.4	2.0	1.70	1.62	2.0	1.30	1.30	1.40
22				2.45	1.95	1.68	1.65	1.95	1.32	1.42	1.42
23				2.7	1.90	1.65	1.62	1.90	1.30	1.30	1.40
24				2.85	1.90	1.55	1.60	1.85	1.32	1.40	
25				2.8	1.85	1.50	1.60	1.62	1.25	1.28	
26				2.7	1.80	1.48	1.55	1.70	1.30	1.30	
27				2.6	4.5	1.45	1.50	1.60	1.32	1.25	
28			6.9	2.6	4.0	1.40	1.45	1.45	1.30	1.38	
29			8.9	2.6	3.7	1.35	1.40	1.40	1.35	1.40	
30			8.5	2.6	3.4	1.32	1.28	1.32	1.20	1.40	
31			7.4		3.0		1.32	1.20		1.38	

NOTE.—Relation of gage height to discharge affected by ice an unknown amount Jan. 7 to 20; no estimates of discharge made.

Daily discharge, in second-feet, of Des Moines River near Fort Dodge, Iowa, for 1911-12.

Day.	Aug.	Sept.	Oct.	Nov.	Day.	Aug.	Sept.	Oct.	Nov.
1911.					1911.				
1		51	170	244	16	85	78	270	194
2		65	170	330	17	51	85	300	170
3		51	194	300	18	65	85	300	170
4	29	65	170	270	19	92	81	270	
5	39	51	151	244	20	85	81	270	
6	39	78	151	218	21	92	92	270	
7	49	92	170	228	22	98	81	244	
8	51	81	151	218	23	81	81	270	
9	45	81	132	218	24	78	81	270	
10	54	218	151	194	25	78	92	270	
11	58	132	151	218	26	81	92	260	
12	65	92	218	194	27	73	81	270	
13	58	435	244	218	28	81	81	270	
14	65	132	270	218	29	65	85	270	
15	65	102	300	218	30	85	92	244	
					31	81		244	

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1912.								
1		1,000	1,000	81	81	102	102	102
2		945	1,000	102	92	102	102	132
3		890	840	108	81	92	85	140
4		890	790	117	73	81	102	132
5			580	132	54	62	81	102
6			540	140	65	102	102	85
7			540	126	65	102	73	85
8			470	117	102	92	92	81
9		1,460	400	102	92	81	81	81
10	1,460	1,220	300	81	65	98	81	85
11	1,340	1,580	330	117	78	117	73	85
12	1,160	1,400	300	132	102	102	170	92
13	890	1,220	300	151	140	102	117	102
14	790	1,110	400	132	132	92	132	117
15	745	620	700	117	102	92	102	132
16	700	620	660	102	140	108	132	140
17	700	620	620	102	132	102	108	151
18	745	580	330	92	132	102	132	140
19	700	540	330	81	218	108	132	132
20	700	660	260	132	365	81	140	132
21	790	470	270	228	470	102	102	132
22	840	435	260	244	435	108	140	140
23	1,110	400	244	228	435	102	102	132
24	1,280	400	194	218	365	108	132	
25	1,220	365	170	218	228	92	98	
26	1,110	330	162	194	270	102	102	
27	1,000		151	170	218	108	92	
28	1,000		132	151	151	102	126	
29	1,000		117	132	132	117	132	
30	1,000		108	98	108	81	132	
31		1,460		108	81		126	

NOTE.—Discharge Nov. 19 to Dec. 31, 1911, estimated, because of ice, from climatologic records and discharge of adjacent drainage areas, as follows: Nov. 19–30, 120 second-feet; Dec. 1–31, 150 second-feet. These estimates of discharge are based on insufficient data and therefore should be used with caution.

Monthly discharge of Des Moines River near Fort Dodge, Iowa, for 1911–12.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
1911.				
August 4-31	98	29	67.4	B.
September	435	51	99.8	B.
October	300	132	229	B.
November	330		183	C.
December			150	D.
1912.				
March [a]				
April [a]				
May [a]				
June	1,000	108	417	B.
July	244	81	137	B.
August	470	54	168	B.
September	117	62	98.1	B.
October	170	73	110	B.
November 1-23	151	81	115	B.

[a] See "Accuracy" in station description.

DES MOINES RIVER AT KEOSAUQUA, IOWA.

Location.—At county bridge, one-fourth mile above old dam site and Government locks.

Records available.—May 30, 1903, to July 16, 1906; April 5 to December 31, 1910 (United States Engineer Corps); August 3, 1911, to December 23, 1912.

Drainage area.—14,300 square miles.

Gage.—Chain gage attached to upstream side of bridge (gage originally attached to downstream side of bridge; changed because of repairs to bridge at unknown date); same gage used throughout period of records. Datum unchanged. A chain length of approximately 36.80 feet maintained May 30, 1903, to November 12, 1912. On November 12, 1912, the chain length was changed to 37.80 feet and the zero of the gage scale moved 1 foot farther from the pulley, the net result being no change in datum. See "Accuracy."

Bench marks.—The following descriptions and elevations of bench marks supersede those published in Water Supply Paper 171. Elevations are referred to gage datum with chain length 37.80 feet.

Bench mark No. 1.—Chiseled cross in the bridge seat stone at northeast corner of right abutment of the county bridge; elevation, 30.31 feet.

Bench mark No. 2.—Spike driven horizontally in the south side near base of oak tree on north side of the road about 100 feet from the bridge; elevation, 32.63 feet.

Bench mark No. 3.—Apparently destroyed.

Channel.—Composed of sand and gravel on the left and rock on the right. Sand shifts at flood stages.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—During 1912 no gage readings were taken when the channel was frozen.

Accuracy.—Wye levels run August 3, 1911, November 12, 1912, and July 11, 1913[1] (before the preparation of this report), show a discrepancy between bench marks and gage datum varying from −0.22 to +0.26 foot. Using average values from these levels (which check among themselves), and taking the elevation of bench mark No. 1 as 30.11 feet, as published in Water Supply Paper 171, the elevation of the zero of the gage has been found to be −0.20 foot, whereas using bench mark No. 2 with elevation 32.88 feet, as published in Water Supply Paper 171, the elevation of the zero of the gage has been found to be +0.25 foot. Bench mark No. 3 has apparently been destroyed and bench mark No. 4 is simply a reference point, being subject to the same changes of elevation as the gage. Since the apparent error in the elevation of the gage practically balances between bench marks Nos. 1 and 2, and there is no definite change in gage on record (except the one from downstream to upstream side of bridge), the daily gage heights and discharge measurements have been referred to the original chain length (36.80 feet), no change has been made in gage datum, and bench mark elevations have been adjusted to correspond. These records should, therefore, be used with caution. However, in view of the fact that five discharge measurements have been made during 1910–1912, the records should be reliable, even though changes have occurred to alter the original relation between gage height and discharge which are subject to more than one interpretation.

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[1] July 11, 1913, by engineers of the Mississippi Power Co., Keokuk, Iowa.

Discharge measurements of Des Moines River at Keosauqua, Iowa, in 1910–1912.

Date.	Hydrographer.	Gage height.[a]	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*	1912.		*Feet.*	*Sec.-ft.*
Aug. 4	A. D. Llewellyn[b]	0.5	719	Apr. 20	J. B. Hill	3.38	7,080
				Nov. 11	S. B. Soulé	.90	1,340
1911.				13	do	.93	1,370
Aug. 3	Follansbee and Kay	.10	266				

[a] Chain length 36.80 feet. See "Gage" paragraph in station description.
[b] Corps of Engineers, U. S. Army.

Daily gage height, in feet, of Des Moines River at Keosauqua, Iowa, for 1912.

[Oscar McCrary, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.9	2.8	2.9	1.05	0.75	0.7	0.6	1.2	0.75
2	14.5	4.4	2.8	1.1	.8	.75	.6	1.05	.8
3	16.0	4.3	2.4	.9	.7	.65	.6	1.05	.85
4	16.6	4.4	2.4	1.0	.75	1.3	.65	1.0	.9
5	15.9	4.5	2.4	.9	.65	1.9	.65	1.0	.9
6	14.5	3.9	2.5	1.0	.7	2.7		1.0	.9
7	12.0	3.3	2.3	.9	.55	1.9		1.0	.85
8	8.7	2.7	2.2	.95	.65	1.5		.95	.8
9	6.8	2.9	1.9	.8	.55	1.1		1.0	.7
10	5.6	2.8	1.95	1.1	.7	1.15		.8	.7
11	5.1	4.5	1.7	.9	.6	1.0		.9	.7
12	4.6		1.65	.9	.6	.95		.95	.7
13	4.6		1.5	1.1	.6	.8	2.9	.9	
14	5.7		1.9	2.3	.65	1.2	3.3	.95	
15	5.1		1.65	2.6	.6	1.4	3.1	1.25	
16	5.1		2.5	1.85	.65	1.4	2.8	1.3	
17	4.9		3.1	1.2	.55	1.2	2.6	1.25	
18	4.2		2.5	1.1	.65	1.2	2.35	1.2	
19	3.9	3.1	2.0	.9	.55	1.0	2.0	1.05	
20	3.2	2.8	2.0	.95	.55	1.05	2.0	1.05	
21	3.5	2.5	1.85	.8	1.2	.9	1.8	1.05	
22	3.4	2.2	1.85	.85	1.4	1.0	1.75	1.0	
23	4.0	2.1	1.6	.7	1.05	.9	1.75	1.0	
24	4.2	1.9	1.6	.9	1.15	.95	1.6	.95	
25	3.7	1.9	1.35	.9	.95	.8	1.5	.9	
26	3.0	1.6	1.4	1.1	1.0	.85	1.45	.95	
27	3.0	1.6	1.2	1.0	.85	.7	1.4	.9	
28	2.8	1.5	1.25	1.0	.9	.8	1.5	.85	
29	2.7	1.5	1.1	.85	.8	.65	1.45	.8	
30	2.8	1.7	1.2	.9	.9	.75	1.4	.75	
31		2.4		.85	.75		1.35		

Daily discharge, in second-feet, of Des Moines River at Keosauqua, Iowa, for 1910–1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.									
1	....	2,280	2,280	1,640	795	730	1,640	730	610
2	....	3,700	2,180	1,640	730	730	1,470	730	670
3	....	3,820	1,990	1,810	730	730	1,470	730	730
4	....	3,010	1,990	1,720	730	730	1,310	730	730
5	5,770	2,480	1,810	1,640	730	730	1,230	730	730
6	11,800	2,380	1,640	1,640	730	795	1,000	610	610
7	9,430	2,380	1,560	1,470	730	795	1,000	610	490
8	6,460	2,680	1,470	1,310	730	860	1,000	610	490
9	5,230	3,340	1,470	1,310	670	730	1,000	610	490
10	4,580	3,010	1,560	1,310	610	670	930	610	490
11	4,320	2,580	1,720	1,150	610	610	860	610	490
12	3,940	2,580	2,080	1,150	610	610	795	610	490
13	3,940	2,380	2,790	1,000	610	795	795	610	490
14	3,700	2,280	4,190	1,000	610	1,080	730	610	490
15	3,700	2,080	4,840	1,150	550	1,000	730	610	490
16	3,460	1,990	4,320	1,150	550	860	730	610	490
17	3,340	1,990	3,580	860	610	730	730	610	490
18	3,230	2,080	3,230	860	930	730	670	610	490
19	3,120	2,180	3,010	860	860	730	610	610	490
20	3,010	2,180	2,680	860	730	610	670	610	490
21	2,790	2,180	2,380	860	6,600	670	730	610	490
22	2,790	2,790	2,080	860	1,900	1,000	730	610	490
23	2,790	3,010	1,990	860	1,390	1,000	730	610	490
24	2,790	2,680	1,900	730	1,150	1,000	670	610	490
25	2,790	2,480	1,810	730	1,000	1,390	610	610	490
26	2,580	2,480	1,810	730	930	1,900	670	610	490
27	2,580	2,580	1,900	730	730	1,560	730	610	490
28	2,580	2,580	1,900	730	730	1,470	730	610	490
29	2,380	2,790	1,810	4,580	730	1,470	730	610	490
30	2,380	2,580	1,640	1,640	730	1,640	730	610	490
31	....	2,480	....	930	730	....	730	....	375

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.						1911.					
1	....	160	8,850	860	730	16	265	860	1,310	730	930
2	....	160	11,500	860	670	17	265	730	1,310	860	930
3	265	160	6,880	860	610	18	265	860	1,470	1,000	1,000
4	375	160	6,320	795	730	19	265	1,470	1,470	930	1,080
5	265	160	4,450	730	1,000	20	265	1,150	1,310	795	1,150
6	265	160	3,010	795	860	21	212	1,150	1,230	860	1,000
7	320	730	2,180	795	730	22	212	1,000	1,150	930	1,080
8	265	320	1,810	888	730	23	265	860	1,000	1,150	1,000
9	265	320	1,640	1,150	730	24	212	1,000	1,000	860	....
10	265	1,180	1,470	1,810	3,940	25	212	1,720	1,000	1,150	....
11	265	1,000	1,310	1,810	2,380	26	181	1,150	1,150	860	....
12	265	2,180	1,310	2,380	1,310	27	181	860	1,000	730	....
13	320	1,640	1,310	1,310	1,150	28	160	3,230	1,000	670	....
14	320	1,470	1,310	730	1,080	29	160	12,600	930	730	....
15	375	1,150	1,310	795	1,000	30	160	7,160	860	730	....
						31	160	....	860	....	....

Daily discharge, in second-feet, of Des Moines River at Keosauqua, Iowa, for 1910–1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.									
1	39,600	5,500	5,770	1,560	1,080	1,000	860	1,810	1,080
2	46,000	10,000	5,500	1,640	1,150	1,080	860	1,560	1,150
3	52,200	9,720	4,450	1,310	1,000	930	860	1,560	1,230
4	54,700	10,000	4,450	1,470	1,080	1,990	930	1,470	1,310
5	51,800	10,300	4,450	1,310	930	3,230	930	1,470	1,310
6	46,000	8,560	4,710	1,470	1,000	5,230	....	1,470	1,310
7	36,100	6,880	4,190	1,310	795	3,230	....	1,470	1,230
8	23,800	5,230	3,940	1,390	930	2,380	....	1,390	1,150
9	17,200	5,770	3,230	1,150	795	1,640	....	1,470	....
10	13,500	5,500	3,340	1,640	1,000	1,720	....	1,150	....
11	12,000	10,300	2,790	1,310	860	1,470	....	1,310	....
12	10,600	9,800	2,680	1,310	860	1,390	....	1,390	....
13	10,600	9,300	2,380	1,640	860	1,150	5,770	1,310	....
14	13,800	8,800	3,230	4,190	930	1,810	6,880	1,390	....
15	12,000	8,300	2,680	4,970	860	2,180	6,320	1,900	....
16	12,000	7,800	4,710	3,120	930	2,180	5,500	1,990	....
17	11,500	7,320	6,320	1,810	795	1,810	4,970	1,900	....
18	9,430	6,820	4,710	1,640	930	1,810	4,320	1,810	....
19	8,560	6,320	3,460	1,310	795	1,470	3,460	1,560	....
20	6,600	5,500	3,460	1,390	795	1,560	3,460	1,560	....
21	7,440	4,710	3,120	1,150	1,810	1,310	3,010	1,560	....
22	7,160	3,940	3,120	1,230	2,180	1,470	2,900	1,470	....
23	8,850	3,700	2,580	1,000	1,560	1,310	2,900	1,470	....
24	9,430	3,230	2,580	1,310	1,720	1,390	2,580	1,390	....
25	8,000	3,230	2,080	1,310	1,390	1,150	2,380	1,310	....
26	6,040	2,580	2,180	1,640	1,470	1,230	2,280	1,390	....
27	6,040	2,580	1,810	1,470	1,230	1,000	2,180	1,310	....
28	5,500	2,380	1,900	1,470	1,310	1,150	2,380	1,230	....
29	5,230	2,380	1,640	1,230	1,150	930	2,280	1,150	....
30	5,500	2,790	1,810	1,310	1,310	1,080	2,180	1,080	....
31	....	4,450	....	1,230	1,080	....	2,080	....	....

NOTE.—The open-channel rating curve has been applied throughout. Relation of gage height to discharge probably affected (an unknown amount) by ice during December, 1910, November and December, 1911, and December, 1912. Estimates of discharge for these months should be used with caution. See "Accuracy" in station description.

Monthly discharge of Des Moines River at Keosauqua, Iowa, for 1910–1912.

[Drainage area, 14,300 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910.						
April 5–30	11,800	2,380	4,060	0.284	0.27	B.
May	3,820	1,990	2,580	.180	.21	B.
June	4,840	1,470	2,320	.162	.18	B.
July	4,580	730	1,260	.088	.10	B.
August	6,600	550	983	.069	.08	B.
September	1,900	610	945	.066	.07	B.
October	1,640	610	876	.061	.07	B.
November	730	610	630	.044	.05	C.
December	730	375	523	.037	.04	D.
1911.						
August 3–31	375	160	251	.018	.02	C.
September	12,600	160	1,560	.109	.12	B.
October	11,500	860	2,350	.164	.19	B.
November	2,380	670	985	.069	.08	C.
1912.						
April	54,700	5,230	18,600	1.30	1.45	B.
May	....	2,380	6,250	.437	.50	B.
June	6,320	1,640	3,440	.241	.27	B.
July	4,970	1,000	1,650	.115	.13	B.
August	2,180	795	1,120	.078	.09	B.
September	5,230	930	1,710	.120	.13	B.
October	6,880	860	2,600	.182	.21	B.
November	1,990	1,080	1,480	.103	.11	B.

NOTE.—See footnote to table of daily discharge.

SANGAMON RIVER NEAR MONTICELLO, ILL.

Location.—At Illinois Central Railroad bridge about one-half mile west of Monticello, Ill.

Records available.—February 4, 1908, to October 1, 1912; October 31 to December 31, 1912, when station was finally discontinued.

Drainage area.—550 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Section is at a pool; measurements prior to 1912 indicated that control was permanent; measurement of July 30, 1912, indicates slight shift.

Discharge measurements.—Made from downstream side of bridge and wooden trestle approach.

Floods.—The flood of May, 1908, reached a height of 15.2 feet on the gage.

Winter flow.—Ice usually affects the relation between gage height and discharge during portions of December, January, and February.

The following discharge measurement was made by P. S. Monk:

July 30, 1912: Gage height, 2.94 feet; discharge, 81.0 second-feet.

Daily gage height, in feet, of Sangamon River near Monticello, Ill., for 1912.

[Martin Doyle, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a]6.3	[a]4.4	[a]10.2	10.4	11.2	4.5	2.53	2.90	......	1.90	2.28	......
2	[a]5.4	......	[a]9.5	10.0	11.5	......	3.15	2.71	2.20	......	2.25	2.95
3	[a]4.8	[a]4.0	......	9.5	10.4	5.3	4.9	2.60	2.20	......	......	2.90
4	[a]5.4	......	6.5	9.0	9.9	4.8	......	......	2.19	......	3.10	3.0
5	[a]5.1	3.7	[a]5.8	8.1	......	4.4	4.9	2.49	2.00	......	2.88	3.0
6	[a]5.3	[a]3.6	[a]5.3	7.8	9.8	4.2	4.5	2.42	2.00	......	3.15	2.94
7	[a]5.15	[a]3.55	[a]4.9	......	9.2	4.0	......	2.40	2.11	......	3.15	2.90
8	[a]5.0	[a]3.4	[a]4.6	8.0	8.5	4.0	3.5	2.39	2.05	......	5.8	......
9	[a]4.8	[a]3.4	[a]4.7	8.0	7.8	......	4.6	2.49	2.00	......	5.8	2.62
10	[a]4.6	[a]3.35	......	7.1	7.1	3.5	4.0	2.50	2.00	......	......	2.50
11	[a]4.4	......	4.0	6.4	6.7	3.4	6.8	......	2.00	......	4.5	2.46
12	[a]4.2	3.25	[a]3.9	5.9	......	3.2	8.3	2.78	1.95	......	4.2	2.42
13	[a]4.1	[a]3.2	3.8	5.6	9.8	3.2	8.9	2.85	1.95	......	4.0	2.68
14	4.0	[a]3.2	3.9	......	9.6	3.2	......	2.88	1.99	......	4.0	2.68
15	[a]4.0	[a]3.15	9.8	9.0	9.6	3.15	7.1	2.59	......	......	5.7	......
16	[a]4.0	[a]3.2	10.0	7.1	9.0	......	6.2	2.50	1.98	......	5.5	2.61
17	[a]4.0	3.45	......	7.6	8.2	3.95	5.0	2.52	2.01	......	......	2.82
18	[a]5.3	......	12.2	8.9	7.5	3.75	4.4	......	2.10	......	4.4	2.75
19	[a]8.5	8.3	13.2	10.0	......	3.55	3.95	3.1	2.05	......	......	2.60
20	[a]8.0	8.4	13.9	10.3	6.2	3.35	3.6	4.0	2.00	......	3.85	2.38
21	......	......	12.8	......	5.8	3.65	......	2.90	2.08	......	3.8	2.31
22	6.0	[a]7.1	11.3	9.3	5.5	3.4	6.1	5.2	......	......	3.6	......
23	5.9	[a]5.3	10.8	......	5.2	......	4.0	3.85	2.00	......	3.5	2.70
24	8.1	[a]4.4	......	8.9	5.0	3.0	3.8	3.5	2.00	......	......	2.69
25	8.3	......	10.7	8.0	4.7	2.88	3.45	......	1.99	......	3.3	......
26	8.0	8.6	10.3	7.2	......	2.79	3.2	2.82	1.95	......	3.2	2.62
27	7.4	10.8	10.0	7.0	4.4	2.73	2.96	2.65	1.95	......	3.1	2.42
28	5.8	10.4	10.3	......	4.6	2.70	......	2.56	1.94	......	3.0	2.38
29	[a]5.2	[a]10.3	11.7	10.5	4.7	2.60	3.25	2.42	......	......	2.96	......
30	[a]4.8	......	11.6	11.9	4.6	......	2.89	2.38	1.90	......	2.85	2.42
31	[a]4.6	......	......	......	4.9	......	......	2.30	......	2.05	......	2.50

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 4 to Feb. 25, and possibly also to some extent during the first part of March. Observer reported ice from 6 to 9 inches in thickness during January, and about 7 inches during the greater part of February. From Feb. 29 to Mar. 11 the river was reported partly frozen, with ice about half an inch in thickness. Gage was not read on Sunday.

Daily discharge, in second-feet, of Sangamon River near Monticello, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	540	....	2,120	2,320	3,240	244	48	76	[a]31	15	33	[a]75
2	382	....	1,520	1,920	3,600	[a]305	98	61	28	....	31	80
3	286	....	1,050	1,520	2,320	366	302	53	28	....	[a]62	76
4	....	....	576	1,260	1,830	296	[a]302	[a]49	28	....	93	84
5	....	....	450	950	[a]1,780	230	302	45	19	....	74	84
6	....	....	366	864	1,740	204	244	41	19	....	98	79
7	....	....	302	[a]892	1,350	180	[a]187	40	24	....	96	76
8	....	....	258	920	1,080	180	130	39	21	....	366	[a]65
9	....	....	272	920	864	[a]155	258	45	19	....	450	54
10	....	....	226	698	698	130	180	46	19	....	[a]347	46
11	....	....	180	558	616	120	636	[a]56	19	....	244	44
12	....	....	170	468	[a]1,180	102	1,010	66	17	....	204	41
13	....	....	160	414	1,740	102	1,220	72	17	....	180	59
14	....	....	170	[a]837	1,590	102	[a]959	74	19	....	180	59
15	....	....	1,740	1,260	1,590	98	698	52	[a]18	....	432	[a]56
16	....	....	1,920	698	1,260	[a]136	522	46	18	....	398	54
17	....	....	[a]3,220	814	980	175	318	47	19	....	[a]314	70
18	....	....	4,530	1,220	790	155	230	[a]70	23	....	230	64
19	....	....	6,080	1,920	[a]656	135	175	93	21	....	[a]198	53
20	....	....	7,200	2,220	522	116	140	180	19	....	165	39
21	....	....	5,440	[a]1,810	450	145	[a]322	76	22	....	160	35
22	....	....	3,360	1,400	398	120	504	350	[a]20	....	140	[a]45
23	....	....	2,700	[a]1,310	350	[a]102	180	165	19	....	130	60
24	....	....	[a]2,700	1,220	318	84	160	130	19	....	[a]120	59
25	....	....	2,650	920	272	74	125	[a]100	19	....	111	[a]56
26	....	1,110	2,220	720	[a]251	67	102	70	17	....	102	54
27	....	2,760	1,920	676	230	62	81	56	17	....	93	41
28	....	2,320	2,220	[a]1,550	258	60	[a]94	50	17	....	84	39
29	....	2,220	3,860	2,430	272	53	106	41	[a]16	....	81	[a]40
30	....	....	3,730	4,120	258	[a]50	75	39	15	....	72	41
31	....	....	[a]3,020	....	302	....	[a]76	34	....	21	....	46

[a] Interpolated.

NOTE.—See footnotes to table of daily gage heights. Daily discharge computed from a rating curve well defined between 46 and 1,830 second-feet (gage heights 2.5 and 9.9 feet), and fairly well defined between 1,920 and 7,360 second-feet (gage heights 10.0 and 14.0 feet). Discharge Jan. 4 to Feb. 25 estimated because of ice, from gage heights, observer's notes, climatologic records and discharge of adjacent drainage areas, as follows: Jan 4–31, 300 second-feet; Feb. 1–25, 200 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Sangamon River near Monticello, Ill., for 1912.

[Drainage area, 550 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	310	0.564	0.65	D.
February	2,760	....	462	.840	.91	D.
March	7,200	160	2,140	3.89	4.48	C.
April	4,120	414	1,290	2.35	2.62	A.
May	3,600	230	1,060	1.93	2.22	A.
June	366	50	145	.264	.29	A.
July	1,220	48	316	.575	.66	A.
August	350	34	76.2	.139	.16	B.
September	31	15	20.2	.037	.04	C.
October						
November	450	31	176	.320	.36	B.
December	84	35	57.4	.104	.12	B.

NOTE.—See footnote to table of daily discharge.

SANGAMON RIVER AT RIVERTON, ILL.

Location.—At Wabash Railroad bridge about one-fourth mile west of depot at Riverton, Ill., about 2½ miles below the mouth of South Fork.

Records available.—February 13, 1908, to December 31, 1912. Station discontinued December 31, 1912.

Drainage area.—2,560 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Slightly shifting; section is at a pool; measurements to date indicate that the point of control is not changing.

Discharge measurements.—Made from downstream side of three-span bridge.

Floods.—The high water of 1883 reached a height of approximately 32 feet on the present gage. The high water of 1875 is said to have been one-half foot lower than this. The high water of October, 1911, reached a height of 27.1 feet.

Winter flow.—Ice may affect the relation between gage height and discharge during short periods of extremely cold weather.

The following discharge measurement was made by P. S. Monk:

July 30, 1912: Gage height, 9.82 feet; discharge, 560 second-feet.

Daily gage height, in feet, of Sangamon River at Riverton, Ill., for 1912.

[J. H. Steele, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	15.3	12.1	21.4	23.0	24.5	12.4	9.8	9.8	8.5	7.6	7.8	8.3
2	14.5	11.9	19.7	23.1	23.8	12.3	9.7	9.8	8.3	7.5	8.1	8.2
3	14.1	11.6	19.3	23.2	23.2	12.2	10.3	9.5	8.2	7.5	8.2	8.2
4	13.4	11.3	19.7	23.0	22.9	12.6	10.2	9.0	8.1	7.5	8.2	8.2
5	13.2	10.8	19.0	22.6	22.8	12.5	10.5	8.7	8.0	7.5	8.3	8.2
6	12.8	10.5	17.5	22.2	22.8	12.0	10.5	8.6	8.0	7.45	8.6	8.3
7	12.6	10.4	15.2	21.8	22.5	11.6	11.8	8.5	8.1	7.5	9.0	8.2
8	12.5	10.3	13.6	21.2	21.8	11.1	12.4	8.4	8.0	7.45	9.6	8.2
9	12.4	10.1	12.4	20.5	21.1	11.0	11.6	....	7.9	7.4	9.5	8.2
10	12.3	10.1	11.9	19.6	20.4	10.6	11.0	8.5	7.9	7.5	9.2	8.0
11	12.2	9.9	11.8	18.5	19.7	10.4	10.8	8.4	7.9	7.5	9.2	8.0
12	12.0	9.8	11.5	17.6	20.5	10.2	11.1	8.4	7.8	7.5	9.6	7.8
13	11.8	9.8	11.3	17.0	21.0	10.1	11.1	8.3	7.7	7.5	10.2	7.8
14	11.6	9.7	12.2	16.7	21.0	10.0	11.2	9.4	7.7	7.5	9.7	8.0
15	11.4	9.6	17.8	16.4	20.3	10.0	11.4	10.5	7.7	7.4	9.6	8.0
16	11.4	9.7	21.1	15.7	19.6	13.1	11.7	10.0	7.7	7.4	9.4	8.0
17	11.3	9.9	22.8	15.4	19.1	15.9	11.8	9.6	7.6	7.4	9.2	8.1
18	12.0	10.4	23.5	19.0	18.6	14.6	11.5	9.8	7.8	7.4	9.4	......
19	16.1	11.6	23.5	21.2	18.0	14.0	10.8	9.7	7.7	....	9.6	8.1
20	17.3	12.9	23.4	21.8	17.2	13.2	10.1	9.2	7.7	....	9.5	8.1
21	17.5	13.1	24.2	20.9	16.1	12.6	9.7	9.3	7.8	....	9.2	7.9
22	17.1	13.6	24.1	19.8	15.0	12.4	9.5	10.9	7.9	....	9.0	7.9
23	17.0	12.7	25.2	19.7	14.2	12.3	9.2	9.8	7.8	....	8.9	7.8
24	17.6	12.6	25.2	20.1	13.5	11.7	9.1	9.2	7.8	....	8.8	7.8
25	17.6	13.4	24.9	19.4	13.1	11.1	9.4	9.5	7.8	....	8.7	7.9
26	16.7	17.2	24.2	18.8	12.6	10.7	9.2	9.3	7.8	....	8.6	7.9
27	15.6	19.4	23.4	19.1	12.6	10.4	9.0	8.9	7.7	....	8.6	7.9
28	15.0	21.7	22.9	20.0	12.5	10.6	8.8	9.3	7.7	....	8.5	7.8
29	14.3	21.8	22.8	21.4	13.1	10.1	9.0	8.9	7.6	....	8.4	7.9
30	13.7	....	23.9	23.7	13.0	9.9	10.0	8.9	7.6	....	8.4	8.0
31	12.9	....	23.2	....	12.6	....	9.7	8.9	....	....	....	8.0

NOTE.—Jan. 8 to 31, Feb. 2, 3, and 4 to 20, observer reported: "No ice at gage." Relation of gage height to discharge probably not affected by ice during 1912.

Daily discharge, in second-feet, of Sangamon River at Riverton, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,820	1,310	7,720	10,300	13,300	1,420	542	542	254	148	168	227
2	2,380	1,240	5,700	10,500	11,900	1,390	513	542	227	138	202	214
3	2,160	1,130	5,330	10,700	10,700	1,350	696	460	214	138	214	214
4	1,830	1,020	5,700	10,300	10,200	1,500	665	344	202	138	214	214
5	1,750	856	5,070	9,620	9,980	1,460	760	287	190	138	227	214
6	1,580	760	4,070	8,940	9,980	1,280	760	270	190	133	270	227
7	1,500	728	2,760	8,300	9,440	1,130	1,200	254	202	138	344	214
8	1,460	696	1,920	7,450	8,300	955	1,420	240	190	133	486	214
9	1,420	634	1,420	6,560	7,320	920	1,130	[a] 247	179	128	460	214
10	1,390	634	1,240	5,610	6,450	792	920	254	179	138	388	190
11	1,350	572	1,200	4,690	5,700	728	856	240	179	138	388	190
12	1,280	542	1,100	4,130	6,560	665	955	240	168	138	486	168
13	1,200	542	1,020	3,780	7,180	634	955	227	158	138	665	168
14	1,130	513	1,350	3,610	7,180	603	990	435	158	138	513	190
15	1,060	486	4,250	3,430	6,340	603	1,060	760	158	128	486	190
16	1,060	513	7,320	3,040	5,610	1,710	1,170	603	158	128	435	190
17	1,020	572	9,980	2,870	5,160	3,140	1,200	486	148	128	388	202
18	1,280	728	11,300	5,070	4,760	2,430	1,100	542	168	128	435	[a] 202
19	3,260	1,130	11,300	7,450	4,370	2,100	856	513	158	......	486	202
20	3,950	1,620	11,100	7,580	3,900	1,750	634	388	158	......	460	202
21	4,070	1,710	12,700	7,060	3,260	1,500	513	411	168	......	388	179
22	3,840	1,920	12,500	5,800	2,650	1,420	460	888	179	......	344	179
23	3,780	1,540	14,900	5,700	2,210	1,390	388	542	168	......	324	168
24	4,130	1,500	14,900	6,120	1,870	1,170	366	388	168	......	305	168
25	4,130	1,830	14,200	5,420	1,710	955	435	460	168	......	287	179
26	3,610	3,900	12,700	4,910	1,500	824	388	411	168	......	270	179
27	2,980	5,420	11,100	5,160	1,500	728	344	324	158	......	270	179
28	2,650	8,160	10,200	6,010	1,460	792	305	411	158	......	254	168
29	2,260	8,300	9,980	7,720	1,710	634	344	324	148	......	240	179
30	1,960	......	12,100	11,700	1,660	572	603	324	148	......	240	190
31	1,620	......	10,700	......	1,500	......	513	324	......	......	......	190

[a] Interpolated.

NOTE.—Daily discharge computed from a rating curve well defined between 138 and 4,370 second-feet (gage heights 7.5 and 18.0 feet). Discharge Oct. 19 to 31 estimated, because gage was not read, from precipitation records at 220 second-feet, varying from about 150 to 400 second-feet.

Monthly discharge of Sangamon River at Riverton, Ill., for 1912.

[Drainage area, 2,560 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	4,130	1,020	2,260	0.883	1.02	C.
February	8,300	486	1,740	.680	.73	C.
March	14,900	1,020	7,640	2.98	3.44	B.
April	11,700	2,870	6,650	2.60	2.90	B.
May	13,300	1,460	5,660	2.21	2.55	A.
June	3,140	572	1,220	.477	.53	A.
July	1,420	305	743	.290	.33	A.
August	888	227	409	.160	.18	A.
September	254	148	176	.069	.08	B.
October	......	......	171	.067	.08	C.
November	665	168	355	.139	.16	A.
December	227	168	194	.076	.09	B.
The year	14,900	......	2,270	.887	12.09	

NOTE.—See footnotes to table of daily discharge.

SANGAMON RIVER NEAR OAKFORD, ILL.

Location.—At highway bridge 3 miles northeast of Oakford, Ill., near the northwest corner of T. 19 N., R. 7 W., 2½ miles above the Chicago, Peoria & St. Louis Railway bridge and 1½ miles above the mouth of Crane Creek.

Records available.—October 26, 1909, to June 30, 1911; December 10, 1911, to March 31, 1912. Station discontinued March 31, 1912.

Drainage area.—5,000 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged. The sea-level elevation of the zero of the gage is 468.80 feet.

Channel.—Shifting; the river for some distance above and below the station has been dredged and straightened, thus increasing the slope considerably and disturbing the regimen of the river. Conditions along the improved section are probably reverting to their former natural state. Measurements to date, however, indicate little if any change in the relation between gage height and discharge.

Discharge measurements.—Made from downstream side of bridge and wooden trestle approaches.

Floods.—The floods of February and March, 1907, May, 1908, and October, 1911, reached a height of about 21 feet by the present gage.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

Accuracy.—Backwater caused by ice jams or drift lodging at the railroad bridge 2½ miles below the gaging station may at times affect the relation between gage height and discharge.

The following discharge measurement was made by P. S. Monk:

July 31, 1912: Gage height, 3.58 feet; discharge, 959 second-feet.

Daily gage height, in feet, of Sangamon River near Oakford, Ill., for 1912.

[E. J. Bonnett, observer.]

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	9.9	....	13.7	16	6.8	4.4	12.5
2	8.7	....	13.6	17	7.0	4.3	14.2
3	8.2	....	12.8	18	7.3	4.8	16.2
4	7.6	....	11.6	19	7.8	5.9	17.0
5	7.6	....	11.1	20	8.5	6.6	17.6
6	7.7	....	10.5	21	10.0	6.0	17.6
7	7.8	....	9.3	22	10.4	6.3	17.3
8	7.9	....	8.1	23	10.5	6.0	17.6
9	8.0	....	7.2	24	10.9	6.3	18.0
10	7.9	....	6.4	25	11.4	7.6	18.1
11	7.8	....	6.0	26	....	11.2	18.0
12	7.8	....	5.8	27	....	12.2	17.7
13	7.5	....	5.8	28	....	13.0	17.2
14	7.2	5.0	7.8	29	....	13.6	17.0
15	7.0	4.5	10.6	30	....	....	17.0
				31	....	....	17.1

NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 5 to Feb. 22. Observer reported as follows: Jan. 10, partly frozen; Jan. 11 to 16, frozen; Jan. 18 to 20, water on both sides; Jan. 21, ice breaking up; Jan. 22 to 23, water on both sides; Jan. 24 to 25, holes in ice; Jan. 26 to Feb. 7, frozen over; Feb. 8, water on sides; Feb. 9 to 13, ice; Feb. 14, holes in ice; Feb. 15 to 17, ice floating; Feb. 25, some slush ice; Feb. 27, ice floating; Feb. 28 to 29, slush ice.

Daily discharge, in second-feet, of Sangamon River near Oakford, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	5,680		10,200	16	2,920	1,340	8,600
2	4,490		10,100	17	3,070	1,290	11,100
3	4,040		8,980	18	3,300	1,560	15,300
4	3,540		7,520	19	3,700	2,250	17,300
5	3,540		6,960	20	4,310	2,770	18,800
6	3,620		6,300	21	5,780	2,320	18,800
7	3,700		5,060	22	6,200	2,540	18,100
8	3,780		3,950	23	6,300	2,320	18,800
9	3,860		3,220	24	6,740	2,540	19,800
10	3,780		2,620	25	7,290	3,540	20,100
11	3,700		2,320	26		7,070	19,800
12	3,700		2,180	27		8,240	19,100
13	3,460		2,180	28		9,240	17,800
14	3,220	1,670	3,700	29		10,100	17,300
15	3,070	1,390	6,410	30			17,300
				31			17,600

NOTE.—Daily discharge computed from a rating curve well defined between 380 and 8,000 second-feet (gage heights 2.0 and 12.0 feet). Above 14,800 second-feet (gage height 16.0 feet) the rating curve is a tangent and is based on one discharge measurement at gage height 16.6 feet. Figures for daily discharge published above are for unobstructed channel and are probably in error an unknown amount from Jan. 5 to Feb. 22 because of ice. See notes to table of daily gage height.

SOUTH FORK OF SANGAMON RIVER NEAR TAYLORVILLE, ILL.

Location.—At the Wabash Railroad bridge about 3½ miles southwest of Taylorville, about one-fourth mile upstream from the highway bridge known as the "Half Acre Bridge."

Records available.—February 11, 1908, to September 30, 1912; November 1 to December 31, 1912, when station was finally discontinued.

Drainage area.—427 square miles.

Gage.—Standard chain gage attached to bridge. On September 2, 1909, the gage datum was lowered 2 feet. The gage heights to August 10, 1909, refer to the old datum; those from August 11 to September 1, 1909, are of no value because of backwater from a construction dam built and used during that period. Gage heights from September 2, 1909, to date, refer to the new datum.

Channel.—In August, 1909, a drainage ditch was dug along the river in this vicinity, straightening the course of the stream, but coinciding with the original channel at the gaging station. The cross section of the channel was not changed at the measuring section, but the relation between gage height and discharge was considerably changed due to the change in slope. The channel shifts to some extent, but measurements to date indicate that the point of control is probably permanent.

Discharge measurements.—Made from downstream side of the bridge.

Floods.—Maximum gage height since establishment of gage, 15.9 feet, occurred in September, 1911. No authentic record of floods prior to the establishment of the station is available.

Winter flow.—Ice may affect the relation between gage height and discharge during parts of December, January, and February.

Accuracy.—During the summer of 1912 the bridge to which the gage is attached was being rebuilt. On August 2 the gaging section was full of false work with drift lodged against it, but the effect of the backwater was not determined. The construction work was not finished on December 31. Because of the probable backwater, the possibility of constant error in the gage heights, and the fact that the unverified 1911 rating table was used throughout, the records at this station from July 1 to December 31 should be used with caution.

No discharge measurements were made at this station during 1912.

Daily gage height, in feet, of South Fork of Sangamon River near Taylorville, Ill., for 1912.

[Joseph Ethridge, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.1	4.8	10.6	11.0	12.0	4.6	3.2	5.0	2.25	....	2.55	2.75
2	5.5	4.4	10.3	10.6	11.1	5.0	5.8	4.8	2.25	....	2.60	2.60
3	5.2	4.2	9.7	10.2	10.3	4.4	5.0	3.0	2.15	....	2.85	2.65
4	5.5	4.1	8.0	10.6	9.6	4.2	4.2	2.65	2.05	....	3.00	2.70
5	5.0	....	6.6	10.1	9.6	4.0	4.0	2.45	2.0	....	2.80	2.75
6	4.7	....	5.6	10.0	9.6	3.9	4.0	2.35	....	....	3.5	2.55
7	4.4	....	4.6	10.0	10.0	3.7	3.8	2.25	....	....	4.0	2.75
8	4.5	....	5.2	9.4	9.6	3.6	3.8	2.35	....	....	3.8	2.65
9	4.5	....	4.8	9.2	9.8	3.4	3.6	2.40	....	....	3.5	2.65
10	4.6	....	4.3	8.6	8.6	3.4	5.1	2.50	1.95	....	3.5	2.55
11	4.5	3.4	4.4	7.6	6.9	3.3	5.2	2.65	1.9	....	3.2	2.60
12	4.4	....	4.6	7.0	8.6	3.2	4.8	2.7	1.9	....	3.2	2.55
13	4.2	....	4.5	7.4	9.8	3.2	4.6	2.45	1.85	....	3.2	2.55
14	4.2	....	5.0	7.4	9.8	3.2	4.4	2.5	1.85	....	3.0	2.55
15	....	....	9.2	7.6	9.4	3.4	4.4	2.65	1.85	....	3.1	2.55
16	....	....	11.0	7.6	8.6	4.4	4.4	6.8	1.85	....	3.05	2.55
17	....	....	12.7	7.0	7.9	6.2	4.0	6.8	1.9	....	2.95	2.75
18	7.7	5.1	12.2	6.6	7.2	7.2	3.1	4.6	2.1	....	2.85	2.75
19	9.2	6.7	12.1	10.0	6.4	6.8	3.0	3.6	2.3	....	2.75	2.75
20	9.8	7.6	11.2	10.0	6.0	6.2	2.75	3.0	2.3	....	2.80	2.75
21	10.0	6.0	11.0	9.8	5.8	5.4	2.75	2.9	2.25	....	2.75	2.75
22	10.2	5.8	12.2	9.2	5.4	4.6	2.65	5.0	2.25	....	2.70	2.75
23	10.0	4.6	12.4	8.2	5.2	4.4	2.55	4.2	2.1	....	2.70	2.70
24	9.7	5.6	11.5	7.6	5.0	4.0	2.45	3.8	2.1	....	2.80	2.65
25	8.7	8.0	10.7	6.9	4.8	3.6	2.35	3.4	2.05	....	2.70	2.60
26	8.2	9.4	10.7	7.0	4.6	3.5	2.30	3.2	2.0	....	2.65	2.60
27	7.3	11.6	9.8	8.2	4.6	3.4	2.25	3.0	1.9	....	2.65	2.60
28	6.5	12.2	10.0	9.6	5.0	3.3	2.15	2.95	1.8	....	2.65	2.60
29	5.9	11.1	10.5	10.0	5.4	3.4	3.8	2.95	1.75	....	2.75	2.65
30	5.4	....	11.7	10.9	5.2	3.4	6.3	2.55	1.8	....	2.65	2.65
31	5.0	....	11.8	....	5.0	....	6.9	2.35	....	....	....	....

NOTE.—Gage heights about July 1 to Dec. 31 affected by backwater from false work and drift obstructing channel, an unknown amount, probably a few tenths for a maximum, with the minimum effect at low water. River reported almost free from drift on Sept. 13, 17, and 22. Gage weight lost on Sept. 6 and replaced Sept. 10. Gage heights Sept. 10 to Dec. 31 subject to unknown constant error due to probable error in chain length caused by replacing weight. See "Accuracy" in station description. Gage heights Jan. 3 to 6, 8 to 13, 15 to 31, Feb. 1, 2, 3, 5 to 10, and 12 to 19, read to top of ice. Relation of gage height to discharge affected by ice about Jan. 3 to Feb. 20. Observer reported ice about 7 inches in thickness during January and from 6 to 11 inches during February. On Jan. 21 observer reported large ice gorge at gaging section.

Daily discharge, in second-feet, of South Fork of Sangamon River near Taylorville, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	252	....	1,500	1,700	2,200	133	58	161	22	....	32	40
2	201	....	1,340	1,500	1,740	161	225	147	22	....	34	34
3	....	....	1,050	1,300	1,340	121	161	50	20	....	44	36
4	....	....	455	1,500	999	109	109	36	16	....	50	38
5	....	....	297	1,240	999	97	97	28	15	....	42	40
6	....	....	209	1,200	999	92	97	26	[a] 15	....	72	32
7	....	....	133	1,200	1,200	82	87	22	[a] 15	....	97	40
8	....	....	177	901	999	77	87	26	[a] 14	....	87	36
9	....	....	147	805	1,100	67	77	27	[a] 14	....	72	36
10	....	....	115	578	578	67	169	30	14	....	72	32
11	....	....	121	397	324	62	177	36	13	....	58	34
12	....	....	133	333	578	58	147	38	13	....	58	32
13	....	....	127	374	1,100	58	133	28	12	....	58	32
14	....	....	161	374	1,100	58	121	30	12	....	50	32
15	....	....	805	397	901	67	121	36	12	....	54	32

[a] Interpolated.

Daily discharge, in second-feet, of South Fork of Sangamon River near Taylorville, Ill., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16			1,700	397	578	121	121	315	12		52	32
17			2,540	333	439	261	97	315	13		48	40
18			2,300	297	353	353	54	133	18		44	40
19			2,240	1,200	279	315	50	77	24		40	40
20			1,800	1,200	243	261	40	50	24		42	40
21		243	1,700	1,100	225	193	40	46	22		40	40
22		225	2,300	805	193	133	36	161	22		38	40
23		133	2,400	490	177	121	32	109	18		38	38
24		209	1,940	397	161	97	28	87	18		42	36
25		455	1,540	324	147	77	26	67	16		38	34
26		901	1,540	333	133	72	24	58	15		36	34
27		2,000	1,100	490	133	67	22	50	13		36	34
28		2,300	1,200	909	161	62	20	48	11		36	34
29		1,740	1,440	1,200	193	67	87	48	10		40	36
30			2,040	1,640	177	67	270	32	11		36	36
31			2,100		161		324	26				[a]36

[a] Estimated.

NOTE.—Daily discharge computed from a rating curve well defined between 58 and 1,440 second-feet (gage heights, 3.2 and 10.5 feet), but which was not verified during 1912 by discharge measurements. Discharge Jan. 3 to Feb. 20 estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 3 to 31, 200 second-feet; Feb. 1 to 20, 80 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of South Fork of Sangamon River near Taylorville, Ill., for 1912.

[Drainage area, 427 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			202	0.473	0.55	D.
February	2,300		338	.792	.85	D.
March	2,540	115	1,180	2.76	3.18	B.
April	1,700	297	833	1.95	2.18	B.
May	2,200	133	642	1.50	1.73	B.
June	353	58	119	.279	.31	C.
July	324	20	101	.237	.27	D.
August	315	22	75.6	.177	.20	D.
September	24	10	15.9	.037	.04	D.
October						
November	97	32	49.5	.116	.13	D.
December	40	32	36.0	.084	.10	D.

NOTE.—See footnotes to tables of daily gage height and daily discharge.

SALT CREEK NEAR KENNEY, ILL.

Location.—At highway bridge about 3 miles west of Kenney, Ill., near the west boundary of T. 19 N., R. 1 E., about three-fourths mile below the Vandalia Railroad bridge.

Records available.—February 14, 1908, to October 2, 1912; October 30 to December 31, 1912, when station was finally discontinued.

Drainage area.—459 square miles.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—Section is at a pool; discharge measurements to date indicate that the point of control is practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of 1882 is said to have been 1½ feet higher than that of 1908, or to have reached a height of about 16 feet by the present gage.

Winter flow.—Ice sometimes affects the relation between gage height and discharge during portions of December, January, and February.

Discharge measurements of Salt Creek near Kenney, Ill., in 1912.

[Hydrographer, P. S. Monk.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 29	2.30	106
29	[a] 2.27	103

[a] Measurement made by wading at about 10 feet below regular section.

Daily gage height, in feet, of Salt Creek near Kenney, Ill., for 1912.

[Chris McDermott, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.7	[a]2.8	6.0	6.0	10.8	2.7	1.7	1.8	1.4	1.1	2.2	2.0
2	3.2	2.0	4.6	6.5	8.0	2.75	2.4	1.8	1.4	1.2	2.45	2.1
3	3.45	....	3.8	5.9	7.0	2.65	1.8	1.65	1.4	....	2.25	2.1
4	4.0	....	3.25	4.8	6.0	2.6	4.9	1.65	1.3	....	2.25	2.1
5	[a]3.5	....	3.0	4.7	8.2	2.5	4.4	1.6	1.5	....	2.0	2.1
6	[a]3.1	....	2.7	4.5	7.3	2.5	3.5	1.55	1.3	....	2.65	2.05
7	[a]3.15	....	2.65	6.1	6.2	2.4	3.0	1.55	1.3	....	3.9	2.05
8	[a]3.05	1.5	2.6	6.1	5.3	2.2	2.7	1.5	1.3	....	3.7	2.0
9	[a]3.0	....	2.5	5.0	4.4	2.2	2.6	1.6	1.2	....	3.4	1.9
10	[a]2.95	....	2.75	4.5	4.4	2.2	2.75	1.8	1.2	....	3.0	1.7
11	[a]2.85	....	2.35	4.0	4.4	2.1	2.7	1.85	1.2	....	2.8	2.0
12	2.15	....	2.3	3.8	5.3	2.05	4.4	1.7	1.2	....	2.6	1.8
13	....	....	2.3	4.1	6.7	2.0	4.0	1.6	1.1	....	4.6	1.9
14	....	....	2.5	4.1	6.2	2.0	3.9	1.8	1.3	....	4.7	1.9
15	....	....	5.8	4.0	5.6	2.0	2.8	1.75	1.2	....	4.2	1.85
16	....	[a]2.35	5.9	4.0	5.1	2.0	2.5	1.65	1.2	....	3.6	1.9
17	....	[a]2.35	8.5	7.3	4.7	2.1	2.15	1.6	1.2	....	3.4	1.9
18	[a]6.2	[a]4.6	10.2	8.2	4.4	2.1	2.15	1.75	1.3	....	3.1	1.9
19	[a]5.5	[a]5.0	13.0	9.0	4.0	2.1	2.05	1.8	1.2	....	2.9	1.85
20	4.2	5.6	10.8	7.2	3.8	2.05	1.95	1.7	1.3	....	2.8	1.85
21	....	[a]5.2	8.8	6.1	3.5	2.8	1.9	1.6	1.3	....	2.7	1.8
22	....	[a]5.0	6.0	6.7	3.4	3.0	2.7	1.9	1.2	....	2.6	1.8
23	....	[a]4.0	8.0	6.1	3.2	2.2	3.0	1.8	1.3	....	2.5	1.9
24	....	[a]2.7	8.0	5.5	3.1	2.0	2.5	1.8	1.3	....	2.4	1.9
25	....	3.3	6.9	4.8	3.0	1.9	2.1	1.8	1.3	....	2.4	1.9
26	4.2	7.7	6.5	5.0	2.8	1.85	2.0	1.7	1.1	....	2.3	1.9
27	[a]4.2	7.3	6.7	4.8	2.7	1.8	1.9	1.55	1.2	....	2.25	1.9
28	[a]3.4	7.7	7.4	5.9	2.85	1.75	1.8	1.5	1.1	....	2.2	1.9
29	2.8	7.7	10.1	9.3	3.5	1.75	2.3	1.5	1.3	....	2.0	1.8
30	[a]3.0	....	11.0	9.6	3.1	1.7	2.0	1.4	1.2	1.3	2.0	1.8
31	[a]3.1	....	9.4	....	2.85	....	2.0	1.4	....	1.4	....	1.75

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 3 to Feb. 23. Observer reported ice 6 to 9 inches in thickness from Jan. 12 to Feb. 15.

Daily discharge, in second-feet, of Salt Creek near Kenney, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	386	....	1,100	1,100	3,410	170	40	49	19	6	95	70
2	206	....	645	1,290	1,950	179	122	49	19	10	130	82
3	....	....	412	1,070	1,490	162	49	36	19	....	102	82
4	....	....	277	707	1,100	153	738	36	14	....	102	82
5	....	....	225	676	2,050	137	584	32	25	....	70	82
6	....	....	170	614	1,620	137	335	28	14	....	162	76
7	....	....	162	1,140	1,170	122	225	28	14	....	439	76
8	....	....	153	1,140	867	95	170	25	14	....	386	70
9	....	....	137	770	584	95	153	32	10	....	311	59
10	....	....	179	614	584	95	179	49	10	....	225	40
11	....	....	115	467	584	82	170	54	10	....	188	70
12	....	....	108	412	867	76	584	40	10	....	153	49
13	....	....	108	495	1,370	70	467	32	6	....	645	59
14	....	....	137	495	1,170	70	439	49	14	....	676	59
15	....	....	1,030	467	966	70	188	44	10	....	524	54
16	....	....	1,070	467	802	70	137	36	10	....	360	59
17	....	....	2,190	1,620	676	82	88	32	10	....	311	59
18	....	....	3,070	2,050	584	82	88	44	14	....	245	59
19	....	....	4,680	2,430	467	82	76	49	10	....	206	54
20	....	....	3,410	1,580	412	76	64	40	14	....	188	54
21	....	....	2,330	1,140	335	188	59	32	14	....	170	49
22	....	....	1,100	1,370	311	225	170	59	10	....	153	49
23	....	....	1,950	1,140	266	95	225	49	14	....	137	59
24	....	170	1,950	933	245	70	137	49	14	....	122	59
25	....	288	1,450	707	225	59	82	49	14	....	122	59
26	....	1,810	1,290	770	188	54	70	40	6	....	108	59
27	....	1,620	1,370	707	170	49	59	28	10	....	102	59
28	....	1,810	1,670	1,070	197	44	49	25	6	....	95	59
29	....	1,810	3,020	2,580	335	44	108	25	14	....	70	49
30	....	....	3,520	2,740	245	40	70	19	10	14	70	49
31	....	....	2,630	....	197	....	70	19	....	19	....	44

NOTE.—Daily discharge computed from a rating curve well defined between 10 and 467 second-feet (gage heights 1.2 and 4.0 feet). Above gage height 4.0 feet the rating curve depends upon one discharge measurement made in 1908 at gage height 10.5 feet. The two discharge measurements made in 1912 verified the 1911 rating curve, indicating no change in the relation of gage height to discharge. Discharge Jan. 3 to Feb. 23 estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 3 to 31, 230 second-feet; Feb. 1 to 23, 130 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Salt Creek near Kenney, Ill., for 1912.

[Drainage area, 459 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	236	0.514	0.59	D.
February	1,810	....	362	.789	.85	D.
March	4,680	108	1,340	2.92	3.37	B.
April	2,740	412	1,090	2.37	2.64	A.
May	3,410	170	821	1.79	2.06	A.
June	225	40	99.1	.216	.24	A.
July	738	40	193	.420	.48	A.
August	59	19	38.0	.083	.10	C.
September	25	6	12.6	.028	.03	C.
October	....	....	....	....	....	
November	676	70	222	.484	.54	A.
December	82	40	60.9	.133	.15	B.

NOTE.—See footnote to table of daily discharge.

CAHOKIA CREEK NEAR POAG, ILL.

Location.—At the Wabash Railroad bridge, about three-fourths mile northeast of the Wabash Railroad station at Poag, Ill.

Records available.—December 13, 1909, to April 6, 1912. Station discontinued April 7, 1912.

Drainage area.—259 square miles.

Gage.—Standard chain gage fastened to bridge; datum unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—Maximum gage height since establishment of gage, 19.0 feet, occurred in October, 1911. See notes under "Accuracy." No available record of floods prior to installation of gage.

Winter flow.—Ice may affect the relation between gage height and discharge during short periods in December, January, and February.

Accuracy.—The high water of October, 1911, was due to cutting off the flood channel to the east of the main channel by a levee built by the East Side Levee and Sanitary District. On April 7, 1912, Cahokia Creek was diverted west from a point near Poag into the Mississippi River just below the mouth of the Missouri instead of flowing into the river near Eads bridge, East St. Louis, Ill.

Remarks.—The data collected are being used by the East Side Levee and Sanitary District of East St. Louis, Ill., in its study for flood control and prevention at that place.

No discharge measurements were made at this station during 1912.

Daily gage height, in feet, of Cahokia Creek near Poag, Ill., for 1912.

[S. T. Sanders, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1	5.8	....	10.0	11.4	16	....	....	14.2	....
2	5.2	3.1	7.8	12.0	17	....	....	16.0	....
3	4.6	....	6.1	14.1	18	2.8	4.0	16.3	....
4	4.2	....	5.0	10.0	19	....	6.3	14.0	....
5	3.6	....	4.3	8.2	20	....	6.8	12.2	....
6	3.4	....	6.0	[a] 12.8	21	6.5	6.0	13.4	....
7	3.4	....	7.2	....	22	6.3	5.2	14.0	....
8	3.3	2.8	7.0	....	23	5.0	4.8	10.2	....
9	3.3	....	6.3	....	24	5.4	4.2	7.9	....
10	3.2	....	6.0	....	25	5.8	5.0	6.4	....
11	3.2	....	6.8	....	26	[b] 6.0	14.4	8.4	....
12	[b] 3.2	....	7.3	....	27	5.8	14.0	12.0	....
13	3.2	....	8.0	....	28	5.5	16.6	14.2	....
14	3.2	....	8.6	....	29	....	12.0	15.3	....
15	....	3.3	12.1	....	30	....	....	16.8	....
					31	....	....	14.0	....

[a] Gage heights worthless after Apr. 6. See "Accuracy" in station description.
[b] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 6 to Feb. 17. Observer reported ice about 5 inches thick from Jan. 18 to Feb. 8.

Daily discharge, in second-feet, of Cahokia Creek near Poag, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1	155	....	641	887	16	....	....	1,490	....
2	123	....	335	1,000	17	....	....	2,630	....
3	93	....	178	1,470	18	....	67	3,000	....
4	75	....	113	641	19	....	188	1,440	....
5	53	....	79	383	20	....	230	1,040	....
6	....	....	167	1,170	21	....	167	1,300	....
7	....	....	269	....	22	....	123	1,440	....
8	....	....	249	....	23	....	103	675	....
9	....	....	188	....	24	....	75	347	....
10	....	....	167	....	25	....	113	196	....
11	....	....	230	....	26	....	1,550	407	....
12	....	....	279	....	27	....	1,440	1,000	....
13	....	....	359	....	28	....	3,380	1,490	....
14	....	....	433	....	29	....	1,000	1,980	....
15	....	....	1,020	....	30	....	....	3,630	....
					31	....	....	1,440	....

NOTE.—Daily discharge computed from a rating curve well defined between 35 and 1,350 second-feet (gage heights 3.0 and 13.6 feet). Above 1,350 second-feet the rating curve is based on one discharge measurement at gage height 16.25 feet.

Discharge Jan. 6 to Feb. 17 estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 6–31, 40 second-feet; Feb. 1–17, 25 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data, and therefore should be used with caution.

Monthly discharge of Cahokia Creek near Poag, Ill., for 1912.

[Drainage area, 259 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	49.6	0.192	0.22	D.
February	3,380	....	306	1.18	1.27	D.
March	3,630	79	908	3.51	4.05	C.

NOTE.—See footnote to table of daily discharge.

KASKASKIA RIVER NEAR ARCOLA, ILL.

Location.—At highway bridge known as the "Bagdad Bridge," about 4 miles west of Arcola, Ill., in the northwest part of T. 14 N., R. 7 E.

Records available.—April 11, 1908, to September 30, 1912; November 1 to December 31, 1912, when station was finally discontinued.

Drainage area.—390 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent. Discharge measurements to date indicate that the point of control is permanent.

Discharge measurements.—Made from downstream side of bridge or by wading.

Floods.—The flood of May, 1908, reached a height of 17.3 feet on the gage.

Winter flow.—Ice sometimes affects the relation between gage height and discharge during portions of December, January, and February.

The following discharge measurement was made by wading at a section about 50 feet below the bridge by P. S. Monk:

July 27, 1912: Gage height, 2.13 feet; discharge, 17.0 second-feet.

Daily gage height, in feet, of Kaskaskia River near Arcola, Ill., for 1912.

[L. L. Pfeifer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.4	......	11.3	9.4	9.6	6.6	4.1	2.0	3.0	......	0.6	1.2
2	5.4	......	9.9	9.3	9.6	6.4	4.2	1.9	2.8	......	.6	1.2
3	5.3	......	8.4	9.3	9.6	6.2	4.5	1.9	2.8	......	.8	1.1
4	5.3	5.3	7.2	9.2	9.4	6.0	5.1	1.8	2.7	......	.8	1.1
5	5.3	......	6.9	9.1	9.2	5.8	5.9	1.8	2.6	......	1.0	1.0
6	5.3	......	6.0	9.0	9.0	5.6	5.7	1.7	2.4	......	1.2	1.0
7	5.3	......	5.7	8.9	9.0	5.4	5.5	1.7	2.1	......	1.4	1.0
8	5.3	......	5.4	8.9	8.9	5.1	4.7	1.6	2.0	......	1.4	1.1
9	5.3	......	5.0	8.7	8.7	5.0	4.3	1.8	1.9	......	1.3	1.1
10	5.3	......	4.6	8.7	8.6	4.7	4.0	2.0	1.9	......	1.2	1.1
11	5.3	5.3	4.9	8.6	8.4	4.7	3.9	2.1	1.8	......	1.2	1.0
12	5.3	......	5.0	8.6	8.2	4.6	3.8	2.0	1.7	......	1.4	0.9
13	5.3	......	5.1	8.6	8.4	4.1	3.6	2.4	1.6	......	1.6	.9
14	5.3	......	5.1	8.4	8.4	4.0	3.9	2.6	1.5	......	1.6	.9
15	......	......	6.2	8.4	9.0	4.0	4.0	2.4	1.4	......	1.5	.9
16	......	......	6.3	8.3	9.1	5.3	4.6	2.3	1.3	......	1.5	.9
17	8.0	8.0	6.8	8.1	9.1	6.8	4.8	2.2	1.2	......	1.4	.9
18	8.0	......	7.7	8.0	9.0	6.9	......	2.0	1.2	......	1.4	.8
19	7.8	......	7.9	7.9	8.9	7.1	......	2.4	1.1	......	1.3	.8
20	7.8	......	8.1	7.9	8.7	6.7	......	2.4	1.0	......	1.3	.8
21	7.7	......	8.4	9.0	8.6	6.4	......	2.3	1.0	......	1.3	.8
22	7.5	......	8.7	9.1	8.4	5.9	......	2.4	1.0	......	1.3	.8
23	7.5	......	8.9	9.0	8.1	5.6	3.0	5.6	0.9	......	1.2	.8
24	......	......	9.1	8.8	7.8	5.4	2.7	5.6	.9	......	1.4	.8
25	......	7.4	9.3	8.6	7.7	5.1	2.7	5.1	.8	......	1.4	.7
26	......	7.4	9.8	8.5	7.6	4.8	2.6	5.0	.8	......	1.3	.7
27	......	7.7	10.1	8.4	7.4	4.6	2.1	4.8	.7	......	1.3	.7
28	......	8.1	10.4	7.9	7.2	4.5	2.2	4.4	.7	......	1.3	.7
29	......	8.1	10.7	8.9	7.2	4.2	2.2	3.8	.7	......	1.2	.7
30	......	......	10.9	9.7	7.0	4.0	2.0	3.6	.6	......	1.2	.7
31	......	......	11.2	......	6.8	......	2.0	3.1	......	......	......	.7

NOTE.—Relation of gage height to discharge affected by ice about Jan. 4 to Feb. 28. Observer reported ice 2 to 8 inches thick during January and 5 to 8 inches during February.

Daily discharge, in second-feet, of Kaskaskia River near Arcola, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	254	......	1,710	1,070	1,130	401	138	15	58	......	0.1	2
2	254	......	1,230	1,030	1,130	372	146	12	48	......	.1	2
3	244	......	767	1,030	1,130	345	170	12	48	......	.5	1.5
4	......	......	500	1,000	1,070	320	224	10	43	......	.5	1.5
5	......	......	448	971	1,000	298	309	10	38	......	1.0	1.0
6	......	......	320	940	940	276	287	8	29	......	2.0	1.0
7	......	......	287	909	940	254	265	8	18	......	4	1.0
8	......	......	254	909	909	224	187	6	15	......	4	1.5
9	......	......	214	850	850	214	154	10	12	......	3	1.5
10	......	......	178	850	822	187	130	15	12	......	2	1.5
11	......	......	205	822	767	187	122	18	10	......	2	1.0
12	......	......	214	822	714	178	114	15	8	......	4	.7
13	......	......	224	822	767	138	98	29	6	......	6	.7
14	......	......	224	767	767	130	122	38	5	......	6	.7
15	......	......	345	767	940	130	130	29	4	......	5	.7
16	......	......	358	740	971	244	178	25	3	......	5	.7
17	......	......	432	689	971	432	196	21	2	......	4	.7
18	......	......	598	665	940	448	173	15	2	......	4	.5
19	......	......	642	642	909	482	150	29	1.5	......	3	.5
20	......	......	689	642	850	416	127	29	1.0	......	3	.5

Daily discharge, in second-feet, of Kaskaskia River near Arcola, Ill., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21			767	940	822	372	104	25	1.0		3	0.5
22			850	971	767	309	81	29	1.0		3	.5
23			909	940	689	276	58	276	.7		2	.5
24			971	879	620	254	43	276	.7		4	.5
25			1,030	822	598	224	43	224	.5		4	.3
26			1,190	794	577	196	38	214	.5		3	.3
27			1,290	767	537	178	18	196	.3		3	.3
28			1,390	642	500	170	21	162	.3		3	.3
29		689	1,500	909	500	146	21	114	.3		2	.3
30			1,560	1,160	465	130	15	98	.1		2	.3
31			1,670		432		15	64				.3

NOTE.—Daily discharge computed from a rating curve well defined between 15 and 665 second-feet (gage heights 2.0 and 8.0 feet), and fairly well defined between 689 and 1,710 second-feet (gage heights 8.1 and 11.3 feet). Discharge Jan. 4 to Feb. 28 estimated, because of ice, from gage heights observer's notes, climatologic records and discharge of adjacent drainage areas, as follows: Jan. 4 to 31, 190 second-feet; Feb. 1 to 28, 200 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Discharge July 18 to 22 interpolated.

Monthly discharge of Kaskaskia River near Arcola, Ill., for 1912.

[Drainage area, 390 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			196	0.503	0.58	D.
February			217	.556	.60	D.
March	1,710	178	741	1.90	2.19	C.
April	1,160	642	859	2.20	2.46	A.
May	1,130	432	807	2.07	2.39	A.
June	482	130	264	.677	.76	C.
July	309	15	125	.321	.37	C.
August	276	6	65.5	.168	.19	C.
September	58	.1	12.3	.032	.04	D.
October						
November	6	.1	2.94	.0075	.008	D.
December	2	.3	.82	.0021	.002	D.

NOTE.—See footnote to table of daily discharge.

KASKASKIA RIVER AT SHELBYVILLE, ILL.

Location.—At highway bridge in the eastern edge of Shelbyville, Ill., just above the Chicago & Eastern Illinois and Big Four railroad bridges.

Records available.—February 25, 1908, to September 30, 1912: November 1, to December 31, 1912, when station was finally discontinued.

Drainage area.—1,030 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Somewhat shifting; section at a pool; point of control unchanged.

Discharge measurements.—Made from downstream side of bridge.

Floods.—Maximum gage height since establishment of gage is 25.8 feet which occurred in May, 1908. No available records of floods prior to installation of gage.

Winter flow.—Ice may affect the relation between gage height and discharge during parts of December, January, and February.

Accuracy.—During high water the relation of gage height to discharge is liable to be affected by backwater caused by drift lodging at the two railroad bridges below the gaging station.

Discharge measurements of Kaskaskia River at Shelbyville, Ill., in 1912.

[Hydrographer, P. S. Monk.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 24	6.18	226
Aug. 23	7.58	653

Daily gage height, in feet, of Kaskaskia River at Shelbyville, Ill., for 1912.

[Homer Pound, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.8	8.1	17.6	16.8	17.3	7.3	6.3	5.7	5.7	......	5.2	5.3
2	8.7	7.7	17.5	16.5	16.4	7.2	6.2	5.6	6.0	......	5.3	5.3
3	8.7	7.5	16.1	16.9	15.9	7.0	6.4	5.6	6.2	......	5.3	5.4
4	8.6	7.4	14.5	16.5	15.2	6.9	6.3	5.5	6.8	......	5.3	5.4
5	8.6	7.4	12.6	18.5	14.9	6.8	6.3	5.5	6.5	......	5.5	5.4
6	8.6	7.3	10.5	14.5	13.0	6.7	6.4	5.5	6.1	......	5.6	5.4
7	8.6	7.2	9.6	13.3	12.1	6.6	6.5	5.4	5.9	......	5.7	5.4
8	8.7	7.1	8.7	12.1	11.2	6.5	6.4	5.4	5.6	......	5.8	5.4
9	8.8	7.0	8.8	11.5	10.9	6.4	6.3	5.4	5.5	......	5.7	5.4
10	8.6	6.9	8.9	11.1	10.4	6.3	8.5	5.5	5.4	......	5.7	5.4
11	8.4	6.9	8.2	10.9	10.1	6.3	7.3	5.6	5.4	......	5.6	5.4
12	8.2	6.8	7.8	10.8	9.9	6.2	6.9	5.9	......	......	5.6	5.4
13	8.0	6.8	7.4	10.7	9.8	6.2	6.7	6.1	......	......	5.6	5.4
14	8.0	6.7	10.2	10.7	9.7	6.1	8.9	6.6	5.3	......	5.6	5.4
15	......	6.7	14.8	10.5	9.8	6.1	8.2	6.7	5.3	......	5.5	5.4
16	......	6.9	16.2	10.4	9.9	7.3	7.4	6.4	5.3	......	5.5	5.4
17	......	7.1	17.9	10.3	9.7	7.7	7.3	6.2	5.3	......	5.5	5.3
18	......	7.4	18.3	10.2	9.4	7.4	7.2	6.5	5.3	......	5.5	5.3
19	......	8.4	18.9	10.7	9.0	7.6	7.1	7.2	5.3	......	5.5	5.3
20	......	9.4	19.0	11.2	8.8	7.9	7.0	8.0	5.3	......	5.4	5.2
21	12.3	9.2	19.4	11.8	8.4	8.0	6.6	9.9	5.3	......	5.4	5.2
22	11.2	9.0	19.3	11.5	8.0	7.6	6.3	8.4	5.3	......	5.4	5.2
23	10.9	8.9	18.7	11.1	7.9	7.2	6.2	7.9	5.3	......	5.4	5.2
24	10.5	9.2	17.6	10.9	7.6	7.0	6.1	7.2	5.3	......	5.4	5.2
25	10.2	12.3	16.6	10.1	7.4	6.8	6.0	6.7	5.3	......	5.4	5.3
26	9.9	16.7	16.1	10.8	7.2	6.6	6.8	7.6	5.3	......	5.4	5.3
27	9.8	17.3	15.6	11.9	7.2	7.7	6.5	6.8	5.3	......	5.4	5.3
28	9.7	18.9	14.1	13.5	7.4	6.6	5.4	6.1	5.3	......	5.4	5.3
29	9.2	18.8	17.1	15.3	7.3	6.5	5.3	6.0	5.2	......	5.4	5.3
30	8.9	......	17.1	17.0	7.5	6.4	5.8	5.9	5.2	......	5.4	5.3
31	8.5	......	16.9	......	7.4	......	5.8	5.8	......	......	......	5.3

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5 to Feb. 21; gage heights, Jan. 6 to 13, Jan. 21 to Feb. 18 and Dec. 12 to 15 were read to top of ice. Observer reported ice about 8 inches thick on Jan. 14.

Daily discharge, in second-feet, of Kaskaskia River at Shelbyville, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,110	......	5,680	5,220	5,500	562	257	122	122	......	51	63
2	1,070	......	5,620	5,040	4,990	528	231	105	182	......	63	63
3	1,070	......	4,820	5,270	4,700	462	284	105	231	......	63	76
4	1,030	......	3,920	5,040	4,310	430	257	90	399	......	63	76
5	......	......	2,900	6,200	4,140	399	257	90	312	......	90	76
6	......	......	1,860	3,920	3,100	369	284	90	206	......	105	76
7	......	......	1,450	3,260	2,650	340	312	76	160	......	122	76
8	......	......	1,070	2,650	2,200	312	284	76	105	......	140	76
9	......	......	1,110	2,350	2,050	284	257	76	90	......	122	76
10	......	......	1,150	2,150	1,810	257	994	90	76	......	122	76
11	......	......	882	2,050	1,680	257	562	105	76	......	105	76
12	......	......	738	2,000	1,580	231	430	160	72	......	105	76
13	......	......	596	1,960	1,540	231	369	206	67	......	105	76
14	......	......	1,720	1,960	1,490	206	1,150	340	63	......	105	76
15	......	......	4,090	1,860	1,540	206	882	369	63	......	90	76

Daily discharge, in second-feet, of Kaskaskia River at Shelbyville, Ill., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16			4,870	1,810	1,580	562	596	284	63		90	76
17			5,850	1,770	1,490	702	562	231	63		90	63
18			6,090	1,720	1,360	596	528	312	63		90	63
19			6,440	1,960	1,190	666	495	528	63		90	63
20			6,500	2,200	1,110	774	462	810	63		76	51
21			6,740	2,500	956	810	340	1,580	63		76	51
22		1,190	6,680	2,350	810	666	257	956	63		76	51
23		1,150	6,320	2,150	774	528	231	774	63		76	51
24		1,270	5,680	2,050	666	462	206	528	63		76	51
25		2,750	5,100	1,680	596	399	182	369	63		76	63
26		5,160	4,820	2,000	528	340	399	666	63		76	63
27		5,500	4,540	2,550	528	702	312	399	63		76	63
28		6,440	3,700	3,380	596	340	76	206	63		76	63
29		6,380	5,390	4,370	562	312	63	182	51		76	63
30			5,390	5,330	630	284	140	160	51		76	63
31			5,270		596		140	140				63

NOTE.—Daily discharge computed from a rating curve poorly defined below 182 second-feet (gage height, 6.0 feet) and well defined between 206 and 7,100 second-feet (gage heights, 6.1 and 20.0 feet). This rating curve differs from that used for 1911 below 528 second-feet (gage height, 7.2 feet), as a result of the two discharge measurements made during 1912. Discharge Jan. 5 to Feb. 21 estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 5 to 31, 820 second-feet; Feb. 1 to 21, 300 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution. No reduction made because of possible effect of ice in December.

Monthly discharge of Kaskaskia River at Shelbyville, Ill., for 1912.

[Drainage area, 1,030 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			852	0.827	0.95	D.
February	6,440		1,250	1.21	1.30	D.
March	6,740	596	4,100	3.98	4.59	B.
April	6,200	1,680	2,960	2.87	3.20	A.
May	5,500	528	1,850	1.80	2.08	A.
June	810	206	441	.428	.48	A.
July	1,150	63	381	.370	.43	A.
August	1,580	76	330	.320	.37	B.
September	399	51	105	.102	.11	C.
October						
November	140	51	88.2	.086	.10	C.
December	76	51	66.9	.065	.07	D.

NOTE.—See footnote to table of daily discharge.

KASKASKIA RIVER AT VANDALIA, ILL.

Location.—At highway bridge at the east end of Main Street, Vandalia, Ill.

Records available.—February 26, 1908, to October 4, 1912; November 1 to December 31, 1912, when station was finally discontinued.

Drainage area.—1,980 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Somewhat shifting; section is at a pool; point of control is apparently permanent.

Discharge measurements.—Made from downstream side of bridge.

Floods.—The flood of May, 1908, reached a height of 21.2 feet on the gage; flood of 1882 was about 22 and that of 1875 about 22.8.

Winter flow.—Ice may affect the relation between gage heights and discharge during portions of December, January, and February.

Remarks.—The river is leveed along the left bank for some miles above and below the station. It is said that the levees, by confining the floods, cause unnatural flood heights along the right bank, and lawsuits to recover damages have resulted. During extreme floods the levees sometimes give way and so reduce the flood height; this occurred during the floods of May, 1908, and October, 1911, flood water for several days passing around the gaging station. Former statements that all the flood water eventually passed the gaging station are in error.

Discharge measurements of Kaskaskia River at Vandalia, Ill., in 1912.

[Hydrographer, P. S. Monk.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Aug. 3	3.08	276
21	8.84	2,110

Daily gage height, in feet, of Kaskaskia River at Vandalia, Ill., for 1912.

[W. F. Radcliff, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.2	5.9	18.3	19.2	15.9	10.4	3.2	5.3	4.0	1.10	1.5	1.0
2	9.9	5.7	17.8	18.4	15.2	10.5	5.0	3.9	4.9	.90	1.7	1.15
3	10.2	5.5	15.8	17.8	14.9	9.5	8.0	3.15	4.5	.85	1.7	1.55
4	10.0	5.4	14.6	17.6	14.8	8.2	9.0	3.1	3.8	.75	1.7	1.75
5	9.4	5.0	12.4	17.3	14.5	7.0	7.0	2.95	3.8	......	1.55	2.0
6	8.6	4.6	10.0	17.0	14.5	6.2	5.1	2.75	3.6	......	1.5	2.45
7	7.9	4.5	8.5	16.1	14.4	5.0	4.4	2.45	3.6	......	1.4	2.1
8	7.4	4.4	8.2	15.2	12.8	4.2	5.0	2.4	3.5	......	1.8	2.0
9	7.2	4.3	7.0	13.0	11.4	4.4	4.7	2.4	3.45	......	1.75	1.85
10	7.0	4.2	6.6	11.7	10.0	4.1	4.5	2.4	3.4	......	1.6	1.8
11	6.8	4.0	6.1	10.0	9.2	3.9	4.8	2.8	3.4	......	1.5	1.7
12	6.2	4.0	6.5	9.3	8.6	3.7	6.3	4.4	3.4	......	1.4	1.65
13	5.8	3.9	8.7	8.7	8.4	3.6	5.6	5.5	3.1	......	1.25	1.6
14	5.4	3.8	13.6	8.5	8.4	3.6	11.1	5.2	3.05	......	1.2	1.45
15	5.0	4.2	15.8	8.3	8.2	3.45	12.6	4.4	3.3	......	1.15	1.3
16	5.2	4.4	17.1	8.3	8.2	3.7	8.4	4.2	2.95	......	1.1	1.3
17	5.2	4.5	18.5	11.6	8.2	4.5	7.0	4.2	2.6	......	1.35	1.2
18	5.1	4.8	19.2	13.4	8.2	5.4	6.2	3.9	2.5	......	2.0	1.2
19	5.1	7.2	19.6	14.1	8.2	6.6	5.6	3.8	2.4	......	2.75	1.15
20	4.9	7.0	19.8	13.4	8.2	7.2	4.6	3.6	2.35	......	3.05	1.0
21	5.0	6.8	19.6	12.4	8.1	6.8	4.0	3.4	2.3	......	2.65	1.0
22	6.0	6.7	19.8	12.0	7.8	6.0	3.6	3.4	2.3	......	1.8	1.25
23	9.1	7.0	19.8	11.9	7.6	5.4	3.45	3.3	2.2	......	1.45	1.1
24	10.5	9.0	19.0	10.7	7.2	5.0	3.45	3.2	2.1	......	1.3	1.1
25	12.2	11.0	18.0	9.8	6.7	4.8	3.3	3.5	1.85	......	1.25	1.1
26	11.5	15.2	18.3	13.6	6.2	4.4	3.25	5.3	1.75	......	1.15	1.15
27	9.0	18.5	18.6	16.8	6.7	3.45	5.0	6.5	1.7	......	1.1	1.25
28	7.0	19.2	19.0	18.2	7.8	4.0	6.5	6.2	1.55	......	1.1	1.3
29	6.6	19.6	19.8	18.7	8.8	4.2	9.0	5.3	1.4	......	1.05	1.4
30	6.2	......	20.1	17.2	9.9	3.35	6.6	4.2	1.15	......	1.0	1.45
31	5.9	......	19.6	......	9.9	......	5.8	4.1	......	......	......	1.5

NOTE.—Relation of gage height to discharge affected by ice about Jan. 2 to 25 and Feb. 3 to 23. Observer reported ice 5 inches thick on Jan. 15 with river entirely frozen over and ice gorged at the railroad bridge above the gaging station on Feb. 4.

Daily discharge, in second-feet, of Kaskaskia River at Vandalia, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,800	1,010	6,340	6,780	5,190	2,710	297	824	470	67	90	62
2	....	945	6,100	6,390	4,860	2,750	738	446	610	58	105	70
3	....	....	5,140	6,100	4,710	2,330	1,720	288	600	56	105	91
4	....	....	4,580	6,010	4,670	1,800	2,120	279	422	52	105	109
5	....	....	3,580	5,860	4,530	1,360	1,360	254	422	....	94	130
6	....	....	2,540	5,720	4,530	1,100	766	222	377	....	90	178
7	....	....	1,920	5,290	4,480	738	573	178	377	....	83	139
8	....	....	1,800	4,860	3,750	520	738	172	356	....	113	130
9	....	....	1,360	3,840	3,140	573	654	172	346	....	109	117
10	....	....	1,230	3,270	2,540	495	600	172	336	....	97	113
11	....	....	1,070	2,540	2,200	446	682	229	336	....	90	105
12	....	....	1,200	2,250	1,960	399	1,130	573	336	....	83	101
13	....	....	2,000	2,000	1,880	377	914	884	279	....	74	97
14	....	....	4,120	1,920	1,880	377	3,000	795	270	....	72	86
15	....	....	5,140	1,840	1,800	346	3,660	573	316	....	70	77
16	....	....	5,770	1,840	1,800	399	1,880	520	254	....	67	77
17	....	....	6,440	3,220	1,800	600	1,360	520	199	....	80	72
18	....	....	6,780	4,020	1,800	854	1,100	446	185	....	130	72
19	....	....	6,970	4,350	1,800	1,230	914	422	172	....	222	70
20	....	....	7,060	4,020	1,800	1,430	627	377	166	....	270	62
21	....	....	6,970	3,580	1,760	1,290	470	336	160	....	206	62
22	....	....	7,060	3,400	1,650	1,040	377	336	160	....	113	74
23	....	....	7,060	3,360	1,580	854	346	316	149	....	86	67
24	....	2,120	6,680	2,830	1,430	738	346	297	139	....	77	67
25	....	2,960	6,200	2,460	1,260	682	316	356	117	....	74	67
26	3,180	4,860	6,340	4,120	1,100	573	306	824	109	....	70	70
27	2,120	6,440	6,490	5,620	1,260	346	738	1,200	105	....	67	74
28	1,360	6,780	6,680	6,300	1,650	470	1,200	1,100	94	....	67	77
29	1,230	6,970	7,060	6,540	2,040	520	2,120	824	83	....	64	83
30	1,100	....	7,210	5,820	2,500	326	1,230	520	70	....	62	86
31	1,010	....	6,970	....	2,500	....	976	495	....	....	....	90

NOTE.—Daily discharge computed from a rating curve well defined between 262 and 2,540 second-feet (gage heights 3 and 10 feet). This curve differs from that used 1908–1911; change in the relation of gage height to discharge probably occurred about Oct. 3, 1911. Discharge Oct. 3 to Dec. 31, 1911, published in Water-Supply Paper 305, has not been revised by new curve. Discharge Jan. 2 to 25, and Feb. 3 to 23, estimated, because of ice, from gage heights, observer's notes, climatologic records and discharge of adjacent drainage areas, as follows: Jan. 2 to 25, 850 second-feet; Feb. 3 to 23, 450 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Kaskaskia River at Vandalia, Ill., for 1912.

[Drainage area, 1,980 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	1,040	0.525	0.61	D.
February	6,970	....	1,430	.722	.78	D.
March	7,210	1,070	5,030	2.54	2.93	B.
April	6,780	1,840	4,200	2.12	2.36	A.
May	5,190	1,100	2,580	1.30	1.50	A.
June	2,750	326	922	.466	.52	A.
July	3,660	297	1,070	.540	.62	B.
August	1,200	172	482	.243	.28	A.
September	610	70	267	.135	.15	B.
October	....	....	....	....	....	
November	270	62	101	.051	.06	C.
December	178	62	89.6	.045	.05	D.

NOTE.—See footnote to table of daily discharge.

KASKASKIA RIVER AT CARLYLE, ILL.

Location.—At the Baltimore & Ohio Southwestern Railroad bridge about one-fourth mile east of the railroad station at Carlyle, Ill.

Records available.—March 2, 1908, to September 30, 1912; November 1 to December 31, 1912, when station was finally discontined.

Drainage area.—2,680 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably shifting. Measurements during 1912 indicate a change in the point of control. Main channel is broken by three bridge piers and flood channel by four additional piers.

Discharge measurements.—Made from downstream side of deck bridge.

Floods.—The flood of 1882, which is the highest known, is said to have attained a height 1½ feet above the flood of 1908, or about 32.5 feet on the present gage.

Winter flow.—Ice may effect the relation between gage height and discharge during portions of December, January, and February.

Artificial control.—A dam 3½ feet high, about 700 feet above the section, is used to store water for the city of Carlyle. The average amount pumped is about 3,500,000 gallons every 30 days, and during June, July, and August, about 4,500,000 gallons every 30 days. The outfalls of one section of the city sewage system and some private sewers are above the section, so that the diversion is negligible.

Accuracy.—See footnotes to table of daily discharge.

Remarks.—The stream never goes dry and during low water the water is hard, which indicates that the flow is kept up by springs.

Discharge measurements of Kaskaskia River at Carlyle, Ill., in 1912.

[Hydrographer, P. S. Monk.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Aug. 19	12.76	1,990
19	12.84	2,020

Daily gage height, in feet, of Kaskaskia River at Carlyle, Ill., for 1912.

[G. J. Klier, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.2	12.3	22.8	25.7	23.8	15.6	9.6	12.2	8.1	....	5.6	5.4
2	14.2	11.6	22.9	24.9	24.1	11.0	10.1	10.0	7.9	....	5.9	5.4
3	13.5	11.1	23.1	24.4	23.8	13.2	10.7	8.4	7.5	....	6.1	5.4
4	12.1	10.9	23.2	24.2	23.5	12.6	12.5	7.8	6.9	....	6.7	5.3
5	[a]11.5	10.5	23.2	24.0	23.1	11.1	13.4	7.3	8.8	....	6.5	5.3
6	[a]10.8	9.7	23.0	23.5	22.8	10.1	13.6	7.0	9.1	....	6.0	5.3
7	[a]10.7	9.5	22.6	23.0	22.2	9.5	13.3	6.9	8.5	....	6.2	5.5
8	[a]10.5	9.4	22.1	22.7	22.0	9.2	11.3	6.8	7.6	....	6.6	5.5
9	[a]10.4	9.1	21.2	22.5	21.8	8.9	9.9	6.9	7.2	....	6.6	5.4
10	....	8.9	19.3	22.2	21.6	8.7	8.7	6.9	7.8	....	6.5	5.4
11	....	8.8	16.2	22.0	21.2	8.4	8.3	7.5	6.6	....	6.2	5.4
12	10.9	8.7	14.7	21.9	20.9	8.2	8.1	7.4	6.5	....	6.1	5.4
13	....	8.5	13.3	21.2	20.2	8.1	8.0	7.7	6.4	....	6.8	5.3
14	....	8.4	15.1	20.4	19.4	7.9	13.0	8.4	6.3	....	6.5	5.3
15	....	8.3	19.2	19.9	18.0	9.3	15.6	10.7	6.1	....	6.3	5.3

[a] Gage height to top of ice.

Daily gage height, in feet, of Kaskaskia River at Carlyle, Ill., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	9.7	8.3	20.4	18.9	14.8	11.2	18.1	10.5	6.3	......	6.3	5.3
17	......	8.4	21.2	18.1	14.1	12.0	19.3	9.9	6.5	......	6.2	5.5
18	......	8.5	22.9	17.4	13.5	13.2	19.6	11.5	6.6	......	6.2	5.5
19	13.2	9.9	22.7	18.2	13.4	12.3	18.4	12.7	6.5	......	6.1	5.4
20	[a] 17.8	11.5	23.4	18.6	12.9	11.1	14.5	10.8	6.2	......	6.1	5.4
21	[a] 18.8	11.8	23.9	19.1	12.7	10.8	12.9	9.7	6.2	......	6.0	5.4
22	19.1	11.7	24.6	19.4	12.1	10.4	10.7	12.4	6.1	......	5.9	5.4
23	19.3	11.4	24.7	19.6	11.8	10.3	10.1	12.8	6.1	......	5.8	5.3
24	19.3	11.8	24.5	19.7	11.7	10.2	8.9	13.5	6.0	......	5.7	5.3
25	18.8	14.6	24.4	19.8	10.9	9.6	8.5	10.9	6.0	......	5.7	5.3
26	17.6	18.9	24.4	20.3	10.5	9.2	8.2	9.9	6.0	......	5.6	5.3
27	16.6	20.0	24.5	21.2	11.2	8.9	7.9	9.2	5.9	......	5.6	5.3
28	15.5	20.7	24.9	22.0	13.5	8.6	7.5	9.1	5.9	......	5.5	5.3
29	14.4	21.9	25.2	22.5	16.7	8.5	7.7	9.2	5.8	......	5.5	5.3
30	13.9	......	25.6	23.2	18.2	8.4	10.2	8.7	5.8	......	5.5	5.3
31	13.0	......	25.9	......	18.6	......	11.9	8.4	......	......	......	5.3

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5 to 25 and Feb. 3 to 17. Observer reported ice 9 to 11 inches in thickness from Jan. 12 to 19.

Daily discharge, in second-feet, of Kaskaskia River at Carlyle, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,360	1,790	7,790	12,200	9,310	2,780	1,010	1,760	597	......	73	50
2	2,360	1,580	7,940	11,000	9,760	1,410	1,150	1,120	544	......	115	50
3	2,150	......	8,240	10,200	9,310	2,060	1,320	678	440	......	145	50
4	1,730	......	8,390	9,910	8,850	1,880	1,850	518	290	......	248	40
5	......	......	8,390	9,610	8,240	1,440	2,120	388	786	......	210	40
6	......	......	8,090	8,850	7,790	1,150	2,180	312	868	......	130	40
7	......	......	7,480	8,090	6,870	980	2,090	290	705	......	160	61
8	......	......	6,720	7,630	6,570	896	1,500	268	466	......	228	61
9	......	......	5,400	7,330	6,270	813	1,090	290	362	......	228	50
10	......	......	4,050	6,870	5,960	759	759	290	518	......	210	50
11	......	......	2,960	6,570	5,400	678	651	440	228	......	160	50
12	......	......	2,510	6,420	5,120	624	597	414	210	......	145	50
13	......	......	2,090	5,400	4,560	597	570	492	192	......	268	40
14	......	......	2,630	4,700	4,100	544	2,000	678	176	......	210	40
15	......	......	4,000	4,360	3,530	924	2,780	1,320	145	......	176	40
16	......	......	4,700	3,850	2,540	1,470	3,560	1,260	176	......	176	40
17	......	......	5,400	3,560	2,330	1,700	4,050	1,090	210	......	160	61
18	......	705	7,940	3,340	2,150	2,060	4,200	1,560	228	......	160	61
19	......	1,090	7,630	3,590	2,120	1,790	3,660	1,910	210	......	145	50
20	......	1,560	8,700	3,720	1,970	1,440	2,450	1,350	160	......	145	50
21	......	1,640	9,460	3,950	1,910	1,350	1,970	1,040	160	......	130	50
22	......	1,610	10,500	4,100	1,730	1,240	1,320	1,820	145	......	115	50
23	......	1,530	10,700	4,200	1,640	1,210	1,150	1,940	145	......	100	40
24	......	1,640	10,400	4,250	1,610	1,180	813	2,150	130	......	86	40
25	......	2,480	10,200	4,300	1,380	1,010	705	1,380	130	......	86	40
26	3,400	3,850	10,200	4,630	1,260	896	624	1,090	130	......	73	40
27	3,080	4,420	10,400	5,400	1,470	813	544	896	115	......	73	40
28	2,750	4,940	11,000	6,570	2,150	732	440	868	115	......	61	40
29	2,420	6,420	11,400	7,330	3,110	705	492	896	100	......	61	40
30	2,270	......	12,000	8,390	3,590	678	1,180	759	100	......	61	40
31	2,000	......	12,500	......	3,720	......	1,670	678	......	......	......	40

NOTE.—Daily discharge computed from a rating curve not well defined. The curve differs from the 1911 curve below 5,660 second-feet (gage height 21.4 feet) as a result of the two discharge measurements made Aug. 19, 1912; the change in relation of gage height to discharge probably occurred about Oct. 7, 1911, but the discharge values from Oct. 7 to Dec. 31, 1911, as published in Water-Supply Paper 305, p. 174, have not been revised by the new curve, the maximum error being about 10 per cent. Discharge Jan. 5 to 25 and Feb. 3 to 17 estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 5 to 25, 1,150 second-feet; Feb. 3 to 17, 750 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Kaskaskia River at Carlyle, Ill., for 1912.

[Drainage area, 2,680 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			1,570	0.586	0.68	D.
February	6,420		1,600	.597	.64	D.
March	12,500	2,090	7,740	2.89	3.33	B.
April	12,200	3,340	6,340	2.37	2.64	A.
May	9,760	1,260	4,400	1.64	1.89	A.
June	2,780	544	1,190	.444	.50	B.
July	4,200	440	1,630	.608	.70	B.
August	2,150	268	966	.360	.42	A.
September	868	100	293	.109	.12	C.
October						
November	268	61	145	.054	.06	C.
December	61	40	46.3	.017	.02	D.

NOTE.—See footnote to table of daily discharge.

KASKASKIA RIVER AT NEW ATHENS, ILL.

Location.—At the Illinois Central Railroad bridge about 600 feet north of the railroad station at New Athens, Ill., about 1 mile below the mouth of Silver Creek and 3 miles above the mouth of Lively Creek.

Records available.—January 23, 1907, to September 30, 1912; October 30 to December 31, 1912, when station was finally discontinued. A record of river heights from January 23, 1907, to October 28, 1909, was kept by Mr. C. J. von Roth Roffy, the present observer, for the New Athens Journal. The river height was taken on Wednesday and Thursday mornings of each week, the river height for Thursday being published Friday with the change in 24 hours as obtained from the river height of Wednesday. This record was kept for the information of farmers living on the west side of the river who were cut off from reaching town when the river reached a height of 30 feet. The record is authentic. The gage heights have been reduced to the present datum, the maximum error probably not being over 0.4 foot, decreasing as the stage increases. The present gage was installed November 1, 1909.

Drainage area.—5,220 square miles.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—Probably permanent. Measurements to date indicate that point of control is permanent.

Discharge measurements.—Made from downstream lower chord of bridge and from wooden trestle approaches.

Floods.—The flood of the fall of 1898 reached a height of about 34.5 feet, referred to the present gage datum.

Winter flow.—The relation between gage height and discharge may be slightly affected by ice during portions of December, January, and February.

Accuracy.—The records at this station should be used with caution because the discharge rating curve above 12,000 second-feet is an extension and it seems probable that backwater from Mississippi River affects the relation of gage height to discharge when the Mississippi is in flood.

The following discharge measurement was made by P. S. Monk:

August 7, 1912: Gage height, 4.92 feet; discharge, 585 second-feet.

Daily gage height, in feet, of Kaskaskia River at New Athens, Ill., for 1912.

[C. J. von Roth Roffy, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.6	11.0	21.6	27.6	24.0	16.0	6.2	8.5	5.8	......	3.4	3.1
2	12.2	10.2	22.4	27.9	24.2	13.9	6.0	9.6	5.3	......	5.1	3.0
3	11.8	9.8	23.0	28.2	24.4	10.8	5.8	9.0	4.9	......	4.9	3.0
4	10.7	9.3	23.0	28.0	24.6	9.6	5.7	7.2	4.6	......	4.4	3.0
5	9.4	8.8	23.0	27.4	24.4	11.1	7.4	6.0	4.4	......	4.0	3.0
6	8.8	8.2	22.8	26.5	24.1	11.0	9.2	5.3	4.2	......	4.0	3.0
7	9.7	7.6	22.4	25.7	23.4	11.0	14.2	4.9	5.0	......	4.0	3.0
8	9.5	7.2	21.8	24.8	22.8	10.3	14.8	4.7	5.4	......	4.5	3.0
9	9.0	6.8	21.4	23.8	22.2	8.6	12.1	4.5	4.7	......	4.4	3.0
10	8.7	6.6	21.0	23.2	21.6	7.4	9.9	4.4	4.4	......	4.6	3.0
11	8.4	6.8	20.8	22.4	21.8	6.8	9.8	4.4	4.2	......	4.4	3.0
12	8.2	6.2	20.6	22.0	21.6	6.4	10.6	4.5	4.0	......	4.2	3.0
13	8.2	6.0	20.0	21.6	21.5	6.0	9.8	6.6	3.9	......	4.0	3.0
14	8.3	5.9	18.6	21.6	21.2	5.8	9.4	9.5	3.8	......	3.9	3.0
15	8.2	5.8	18.8	21.5	20.7	5.7	15.4	8.5	3.7	......	4.4	3.0
16	8.0	5.8	20.0	21.0	20.2	9.3	17.0	9.6	3.6	......	4.7	3.0
17	7.7	5.8	21.5	21.0	19.0	18.0	17.5	10.0	3.6	......	4.6	3.0
18	8.6	5.8	22.4	21.1	16.0	20.5	17.3	8.2	4.0	......	4.4	3.0
19	13.9	6.4	23.2	20.8	12.2	21.2	17.2	7.6	4.0	......	4.0	3.0
20	16.0	6.2	23.6	20.4	11.0	21.4	17.4	8.6	3.8	......	3.8	3.0
21	16.8	8.8	23.8	20.1	10.6	21.0	16.8	9.0	3.9	......	3.7	3.0
22	17.6	9.4	24.1	20.0	10.4	20.0	17.5	8.0	3.9	......	3.6	3.0
23	18.2	10.2	24.4	19.4	9.8	17.0	16.8	7.2	3.8	......	3.4	3.0
24	18.4	10.0	24.6	18.8	9.2	11.4	11.8	9.8	3.8	......	3.3	3.0
25	18.2	9.8	25.0	18.2	8.8	8.8	8.6	9.9	3.7	......	3.2	3.0
26	17.9	15.7	25.4	20.2	10.0	8.0	7.4	8.8	3.6	......	3.2	2.9
27	17.5	19.0	25.5	22.6	9.2	7.4	6.4	9.4	3.4	......	3.2	2.9
28	16.7	20.2	25.4	23.4	9.8	7.0	5.9	9.1	3.4	......	3.1	2.9
29	15.3	21.0	25.8	23.8	12.8	7.2	5.6	7.8	3.3	......	3.1	2.9
30	13.6	......	26.7	24.0	15.7	6.6	5.4	7.3	3.2	2.8	3.1	2.9
31	12.2	......	27.3	......	16.0	......	6.0	6.4	......	2.8	......	2.8

NOTE.—Relation of gage height to discharge affected by ice about Jan. 6 to 27, and possibly also to some extent during February and December.

Daily discharge, in second-feet, of Kaskaskia River at New Athens, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,190	3,300	14,400	35,100	22,700	6,460	938	1,950	802	......	280	236
2	3,960	2,860	17,200	36,200	23,400	4,970	870	2,530	656	......	606	222
3	3,740	2,640	19,200	37,200	24,100	3,190	802	2,200	560	......	560	222
4	3,140	2,360	19,200	36,500	24,800	2,530	770	1,340	494	......	454	222
5	2,420	2,100	19,200	34,400	24,100	3,360	1,420	870	454	......	378	222
6	......	1,800	18,600	31,300	23,000	3,300	2,310	656	414	......	378	222
7	......	1,510	17,200	28,600	20,600	3,300	5,160	560	582	......	378	222
8	......	1,340	15,100	25,500	18,600	2,920	5,580	516	682	......	474	222
9	......	1,170	13,700	22,000	16,500	2,000	3,900	474	516	......	454	222
10	......	1,090	12,400	19,900	14,400	1,420	2,700	454	454	......	494	222
11	......	1,170	11,800	17,200	15,100	1,170	2,640	454	414	......	454	222
12	......	938	11,400	15,800	14,400	1,010	3,080	474	378	......	414	222
13	......	870	10,300	14,400	14,100	870	2,640	1,090	360	......	378	222
14	......	836	8,710	14,400	13,000	802	2,420	2,480	344	......	360	222
15	......	802	8,910	14,100	11,600	770	6,000	1,950	328	......	454	222
13	......	802	10,300	12,400	10,600	2,360	7,260	2,530	312	......	516	222
17	......	802	14,100	12,400	9,120	8,130	7,680	2,750	312	......	494	222
18	......	802	17,200	12,700	6,460	11,100	7,520	1,800	378	......	454	222
19	......	1,010	19,900	11,800	3,960	13,000	7,430	1,510	378	......	378	222
20	......	938	21,300	11,000	3,300	13,700	7,600	2,000	344	......	344	222

Daily discharge, in second-feet, of Kaskaskia River at New Athens, Ill., for 1912—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21		2,100	22,000	10,500	3,080	12,400	7,100	2,200	360		328	222
22		2,420	23,000	10,300	2,970	10,300	7,680	1,700	360		312	222
23		2,860	24,100	9,580	2,640	7,260	7,100	1,340	344		280	222
24		2,750	24,800	8,910	2,310	3,520	3,740	2,640	344		264	222
25		2,640	26,200	8,310	2,100	2,100	2,000	2,700	328		250	222
26		6,220	27,500	10,600	2,750	1,700	1,420	2,100	312		250	210
27		9,120	27,900	17,900	2,310	1,420	1,010	2,420	280		250	210
28	7,020	10,600	27,500	20,600	2,640	1,250	836	2,260	280		236	210
29	5,930	12,400	28,900	22,000	4,310	1,340	738	1,610	264		236	210
30	4,790		32,000	22,700	6,220	1,090	682	1,380	250	198	236	210
31	3,960		34,100		6,460		870	1,010		198		198

NOTE.—Daily discharge computed from a rating curve well defined between 378 and 12,400 second-feet (gage heights 4.0 and 21.0 feet). See "Accuracy" in station description.

Mean discharge Jan. 6 to 27, estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas, at 2,300 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data, and therefore should be used with caution. No correction applied for possible effect of ice during February and December.

Monthly discharge of Kaskaskia River at New Athens, Ill., for 1912.

[Drainage area, 5,220 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			2,900	0.556	0.64	D.
February	12,400	802	2,770	.531	.57	D.
March	34,100	8,710	19,300	3.70	4.27	C.
April	37,200	8,310	19,500	3.74	4.17	C.
May	24,800	2,100	11,300	2.16	2.49	B.
June	13,700	770	4,290	.822	.92	B.
July	7,680	682	3,610	.692	.80	A.
August	2,750	454	1,610	.308	.36	A.
September	802	250	409	.078	.09	C.
October						
November	606	236	378	.072	.08	C.
December	236	198	220	.042	.05	D.

NOTE.—See footnote to table of daily discharge.

SHOAL CREEK NEAR BREESE, ILL.

Location.—At the Baltimore & Ohio Southwestern Railroad bridge about 1½ miles east of Breese, Ill., and about 3 miles above the mouth of Beaver Creek.

Records available.—November 5, 1909, to September 30, 1912; October 30 to December 31, 1912, when station was finally discontinued.

Drainage area.—760 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Practically permanent; rough, as rock has been placed in bed of stream under bridge to prevent scour.

Discharge measurements.—Made from upstream side of bridge and also from downstream side of wooden trestle over overflow channel during floods. There is a good wading section just above the bridge.

Floods.—The maximum gage height since establishment of the gage—19.6 feet—occurred in October, 1911. No available records of floods prior to installation of gage.

Winter flow.—The relation between gage height and discharge may be slightly affected by ice during short periods in December, January, and February.

Regulation.—The intake of the Breese municipal pumping system is about one-fourth mile above the section, but the quantity of water diverted is negligible.

Remarks.—The stream is fed by springs and has never been known to go dry at this point.

The following discharge measurement made was by wading at a section about 20 feet above the bridge by P. S. Monk:

August 19, 1912: Gage height, 1.48 feet; discharge, 63.0 second-feet.

Daily gage height, in feet, of Shoal Creek near Breese, Ill., for 1912.

[John Nordman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.7	2.1	18.1	18.4	18.6	3.4	1.85	0.95	1.2	......	1.5	1.2
2	3.1	1.9	17.9	18.6	18.4	3.3	1.45	.95	1.2	......	1.3	1.2
3	2.6	1.8	15.7	17.4	17.6	3.2	1.8	1.05	1.1	......	1.3	1.25
4	2.4	1.75	8.0	14.2	13.2	2.8	1.95	1.05	1.1	......	1.3	1.3
5	2.3	1.7	5.5	13.4	9.0	2.6	2.5	1.1	1.05	......	1.3	1.25
6	2.2	1.7	4.0	9.4	5.0	2.2	1.8	1.1	1.05	......	1.75	1.2
7	1.9	1.65	3.6	6.8	4.4	1.85	1.5	1.05	1.05	......	1.8	1.2
8	1.7	1.65	3.5	6.8	3.4	1.65	1.55	1.05	1.0	......	1.8	1.2
9	1.7	1.65	3.4	6.8	3.2	1.45	1.35	1.2	1.0	......	1.75	1.2
10	1.65	1.65	3.5	6.8	3.2	1.45	2.4	1.15	1.0	......	1.4	1.2
11	1.65	1.65	3.8	6.4	5.0	1.4	6.2	1.15	1.15	......	1.35	1.2
12	1.6	1.6	......	6.3	9.0	1.35	2.1	1.15	1.2	......	1.2	1.15
13	1.6	1.6	......	6.0	8.4	1.35	1.95	1.3	1.15	......	1.2	1.15
14	1.6	1.6	......	8.6	5.2	1.3	7.2	1.45	1.1	......	1.4	1.2
15	1.6	1.6	......	13.0	3.6	4.8	6.5	1.65	1.1	......	1.95	1.15
16	1.6	1.7	......	11.4	3.0	1.95	2.0	1.85	1.1	......	1.8	1.2
17	1.6	1.75	......	12.2	2.6	9.0	7.0	1.65	1.1	......	1.6	1.15
18	5.4	2.1	......	13.7	2.6	10.4	10.4	2.6	1.15	......	1.4	1.2
19	9.4	3.7	......	15.4	2.4	4.4	7.4	1.6	1.15	......	1.35	1.2
20	12.5	6.4	......	15.6	2.2	3.4	3.6	1.4	1.1	......	1.2	1.2
21	11.2	6.1	......	11.4	2.1	3.2	2.0	1.35	1.1	......	1.2	1.2
22	6.2	4.4	18.4	7.0	2.0	2.8	2.0	3.1	1.1	......	1.2	1.2
23	5.1	2.3	17.6	8.0	1.8	2.4	1.75	1.6	1.1	......	1.2	1.2
24	5.0	2.2	17.2	7.8	5.0	1.95	1.6	1.3	1.1	......	1.2	1.2
25	5.7	4.8	16.6	7.6	3.6	1.55	1.55	1.35	1.1	......	1.2	1.2
26	5.6	13.1	12.6	15.2	3.0	1.35	1.35	1.4	1.1	......	1.3	1.2
27	4.6	15.2	14.6	16.2	2.4	1.35	1.25	3.2	1.05	......	1.3	1.2
28	4.2	16.0	15.2	17.0	6.5	1.65	1.25	1.55	1.05	......	1.25	1.2
29	3.1	17.2	16.9	18.0	6.4	1.5	1.05	1.4	1.05	......	1.2	1.2
30	2.7	......	18.0	18.6	8.8	1.45	1.05	1.4	1.05	0.9	1.2	1.2
31	2.5	......	18.8	......	4.4	......	1.0	1.3	......	.9	......	1.2

NOTE.—Relation of gage height to discharge affected by ice about Jan. 8 to 21, and Feb. 4 to 22. Gage not read Mar. 12 to 21 because of displacement resulting from reconstruction of railroad bridge.

Daily discharge, in second-feet, of Shoal Creek near Breese, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	696	132	4,930	5,320	5,580	299	52	26	41	......	65	41
2	251	114	4,670	5,580	5,320	283	60	26	41	......	48	41
3	183	106	2,770	4,050	4,290	267	92	32	35	......	48	44
4	161	......	1,110	2,380	2,160	206	107	32	35	......	48	48
5	151	......	660	2,210	1,300	180	168	35	32	......	48	44
6	141	......	400	1,380	570	133	92	35	32	......	88	41
7	114	......	332	894	468	97	65	32	32	......	92	41
8	......	......	315	894	299	78	70	32	29	......	92	41
9	......	......	299	894	267	60	52	41	29	......	88	41
10	......	......	315	894	267	60	156	38	29	......	56	41
11	......	......	366	822	570	56	786	38	38	......	52	41
12	......	......	......	804	1,300	52	122	38	41	......	41	38
13	......	......	......	750	1,190	52	107	48	38	......	41	38
14	......	......	......	1,220	606	48	966	60	35	......	56	41
15	......	......	......	2,120	332	536	840	78	35	......	107	38

Daily discharge, in second-feet, of Shoal Creek near Breese, Ill., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	......	......	......	1,780	235	107	112	97	35	......	92	41
17	......	......	......	1,940	180	1,300	930	78	35	......	74	38
18	......	......	......	2,270	180	1,580	1,580	180	38	......	56	41
19	......	......	......	2,680	156	468	1,000	74	38	......	52	41
20	......	......	......	2,740	133	299	332	56	35	......	41	41
21	......	......	......	1,780	122	267	112	52	35	......	41	41
22	786	......	5,320	930	112	206	112	251	35	......	41	41
23	588	151	4,290	1,110	92	156	88	74	35	......	41	41
24	570	141	3,810	1,070	570	107	74	48	35	......	41	41
25	696	536	3,160	1,040	332	70	70	52	35	......	41	41
26	678	2,140	2,030	2,620	235	52	52	56	35	......	48	41
27	502	2,620	2,470	2,960	156	52	44	267	32	......	48	41
28	484	2,880	2,620	3,570	840	78	44	70	32	......	44	41
29	251	3,810	3,450	4,800	822	65	32	56	32	......	41	41
30	195	......	4,800	5,580	1,260	60	32	56	32	23	41	41
31	172	......	5,840	......	468	......	29	48	......	23	......	41

NOTE.—Daily discharge computed from a rating curve well defined between 66 and 570 second-feet (gage heights 1.3 and 5.0 feet), and fairly well defined throughout the remainder of the range of discharge covered by the 1912 gage heights. Two rating curves were used for 1912, the change, made Mar. 1, being based on the discharge measurements made Aug. 19, 1912.

Discharge Jan. 8 to 21 and Feb. 4 to 22 estimated because of ice, from gage heights, climatologic records and discharge of adjacent drainage areas, as follows: Jan. 8 to 21, 250 second-feet, Feb. 4 to 22, 130 second-feet.

Discharge Mar. 12 to 21 estimated because of missing gage heights resulting from reconstruction of bridge, from climatologic records and discharge of adjacent drainage areas, at 2,900 second-feet.

These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice and based on insufficient data, and therefore should be used with caution.

Monthly discharge of Shoal Creek near Breese, Ill., for 1912.

[Drainage area, 760 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	......	......	325	0.428	0.49	D.
February	3,810	......	521	.686	.74	D.
March	......	......	2,680	3.53	4.07	C.
April	5,580	750	2,240	2.95	3.29	B.
May	5,580	92	981	1.29	1.49	B.
June	1,580	48	242	.318	.35	A.
July	1,580	29	270	.355	.41	A.
August	267	26	67.9	.089	.10	B.
September	41	29	34.7	.046	.05	C.
October	......	......	......	......	......	
November	107	41	57.1	.075	.08	C.
December	48	38	41.0	.054	.06	C.

NOTE.—See footnote to table of daily discharge.

SILVER CREEK NEAR LEBANON, ILL.

Location.—At highway bridge at Wrights Crossing, about 2 miles west of Lebanon, Ill., between the Baltimore & Ohio Southwestern and the East St. Louis & Suburban Railroad bridges across Silver Creek.

Records available.—March 3, 1908, to September 30, 1912; November 3 to December 31, 1912, when station was finally discontinued.

Drainage area.—335 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent.

Discharge measurements.—Made from downstream side of bridge and small approach spans, and also at high stages from downstream side of 3 steel viaducts on road west of bridge.

Floods.—The maximum stage since establishment of gage—15.9 feet—occurred in May, 1908. No available records of floods prior to the establishment of the station.

Winter flow.—Ice may affect the relation of gage height to discharge during parts of December, January, and February.

Accuracy.—From March 3, 1908, to May 10, 1909, the gage was so situated that 2 feet was the lowest obtainable reading, and the gage reader noted that the stream was dry whenever the water surface was below 2 feet. On inquiry he stated that the stream was dry for only one week during 1908; therefore, where the gage heights have been marked "Dry" during this period this note was inserted "Dry under gage, can not obtain gage height of water surface." The position of the gage was changed on May 10, 1909, so as to obviate this difficulty.

The following discharge measurement was made by P. S. Monk:

August 5, 1912: Width, 25 feet; area, 65.5 square feet; mean velocity, 0.06 foot per second; gage height, 1.85 feet; discharge, 4.2 second-feet. This measurement is not considered accurate because of the low velocity.

Daily gage height, in feet, of Silver Creek near Lebanon, Ill., for 1912.

[E. C. Turner, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4	2.9	12.8	12.6	13.5	3.0	2.3	1.9	1.9	......	......	1.8
2	5.1	2.9	12.2	11.9	12.6	3.3	2.3	1.9	1.8	......	......	1.9
3	4.4	2.8	10.5	11.6	11.9	4.0	2.3	1.9	1.7	......	1.9	1.9
4	3.8	2.8	7.1	11.8	7.5	3.1	2.4	1.75	1.6	......	1.9	2.0
5	3.2	2.8	6.0	11.8	......	2.7	2.5	1.85	1.5	......	2.3	2.0
6	2.7	2.7	5.6	8.7	3.8	7.4	2.3	1.8	1.5	......	5.4	2.0
7	2.5	2.7	4.6	9.2	3.4	9.8	8.6	1.8	1.5	......	5.1	2.0
8	2.4	2.7	4.2	9.0	3.3	5.7	4.3	1.8	1.5	......	4.4	2.0
9	2.3	2.7	4.3	6.1	3.1	3.6	2.9	1.8	1.5	......	3.7	1.9
10	2.3	2.7	4.6	4.2	3.0	2.6	7.7	1.9	1.4	......	3.1	1.9
11	2.3	2.7	5.0	3.8	5.1	2.4	4.3	1.8	1.4	......	2.7	1.9
12	2.3	2.7	5.1	3.6	9.8	2.3	3.0	1.8	1.4	......	2.3	1.8
13	2.3	2.7	5.8	3.4	7.5	2.2	5.0	4.9	1.3	......	2.1	1.8
14	2.3	2.7	8.6	8.7	4.6	2.2	7.8	3.2	1.3	......	2.1	1.7
15	2.3	2.7	11.4	7.1	3.6	9.2	10.1	9.9	1.9	......	2.0	1.7
16	2.3	3.0	11.6	5.3	3.3	10.8	10.9	7.9	2.4	......	2.0	1.8
17	8.5	3.5	11.6	5.7	3.1	12.5	12.2	3.7	2.1	......	2.0	1.8
18	10.6	4.1	11.6	10.4	3.0	12.7	12.0	5.1	2.9	......	2.0	2.0
19	10.6	5.2	11.4	11.0	2.9	12.6	12.0	4.0	2.2	......	1.95	2.0
20	10.8	6.7	13.6	11.7	2.6	12.1	12.4	2.7	1.9	......	1.95	1.95
21	10.9	6.3	12.5	......	2.5	9.2	9.4	2.3	2.9	......	1.9	1.95
22	8.2	5.2	12.4	5.4	2.5	5.1	6.3	5.0	3.3	......	1.9	1.9
23	8.1	3.9	12.4	7.5	2.6	3.8	5.3	4.2	3.4	......	1.9	1.9
24	7.9	3.8	12.1	5.7	2.6	3.1	3.3	3.8	2.9	......	1.9	1.9
25	7.2	8.0	9.1	3.9	3.9	2.8	2.6	3.7	2.3	......	1.9	1.85
26	7.2	11.2	7.0	11.5	5.4	2.7	2.4	7.1	1.9	......	1.9	1.85
27	6.1	12.5	10.9	13.8	2.6	2.6	2.2	8.6	1.8	......	1.85	1.85
28	5.4	13.9	11.9	......	6.4	3.6	2.2	4.0	1.7	......	1.85	1.85
29	4.6	13.7	13.7	13.2	10.0	2.5	2.1	2.5	1.6	......	1.85	1.85
30	4.2	......	14.6	13.1	......	2.3	1.9	2.2	1.6	......	1.8	1.9
31	2.9	......	......	......	4.0	......	1.95	2.0	......	......	......	1.9

NOTE.—Jan. 2 to Feb. 16, gage heights read to top of ice. Feb. 17, gage height to water surface; water on top of ice. Relation of gage height to discharge affected by ice about Jan. 7 to Feb. 22.

Daily discharge, in second-feet, of Silver Creek near Lebanon, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	271	......	1,980	1,780	2,680	41	17	8	8	......	15	7
2	164	......	1,400	1,190	1,780	54	17	8	7	......	10	8
3	116	......	750	1,050	1,190	92	17	8	6	......	8	8
4	80	......	335	1,140	375	45	20	6.5	5	......	8	10
5	49	......	235	1,140	228	29	23	7.5	4	......	17	10
6	29	......	203	504	80	365	17	7	4	......	187	10
7	......	......	129	564	59	639	492	7	4	......	164	10
8	......	......	104	540	54	211	110	7	4	......	116	10
9	......	......	110	244	45	69	37	7	4	......	74	8
10	......	......	129	104	41	26	395	8	3	......	45	8
11	......	......	157	80	164	20	110	7	3	......	29	8
12	......	......	164	69	639	17	41	7	3	......	17	7
13	......	......	219	59	375	14	157	150	2.5	......	12	7
14	......	......	492	504	129	14	405	49	2.5	......	12	6
15	......	......	975	335	69	564	679	652	8	......	10	6
16	......	......	1,050	179	54	814	836	415	20	......	10	7
17	......	......	1,050	211	45	1,680	1,400	74	12	......	10	7
18	......	......	1,050	730	41	1,880	1,240	164	37	......	10	10
19	......	......	975	860	37	1,780	1,240	92	14	......	9	10
20	......	......	2,780	1,090	26	1,320	1,580	29	8	......	9	9
21	......	......	1,680	638	23	564	588	17	37	......	8	9
22	......	......	1,580	187	23	164	262	157	54	......	8	8
23	......	86	1,580	375	26	80	179	104	59	......	8	8
24	......	80	1,320	211	26	45	54	80	37	......	8	8
25	......	425	552	86	86	33	26	74	17	......	8	7.5
26	......	915	325	1,010	187	29	20	335	8	......	8	7.5
27	......	1,680	836	2,980	26	26	14	492	7	......	7.5	7.5
28	......	3,080	1,190	2,680	271	69	14	92	6	......	7.5	7.5
29	......	2,880	2,880	2,380	665	23	12	23	5	......	7.5	7.5
30	......	......	3,820	2,280	378	17	8	14	5	......	7	8
31	......	......	2,800	......	92	......	9	10	......	......	......	8

NOTE.—Daily discharge computed from a discharge rating curve well defined between 29 and 307 second-feet (gage heights 2.7 and 6.8 feet) and fairly well defined between 316 and 2,180 second-feet (gage heights 6.9 and 13.0 feet). Discharge Jan. 7 to Feb. 22 estimated, because of ice, from gage heights, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 7 to 31, 130 second-feet; Feb. 1 to 22, 40 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data, and therefore should be used with caution. Discharge Nov. 1 and 2 estimated. Discharge Apr. 21, 28, May 5 and 30, interpolated.

Monthly discharge of Silver Creek near Lebanon, Ill., for 1912.

[Drainage area, 335 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	......	......	128	0.382	0.44	D.
February	3,080	......	346	1.03	1.11	D.
March	3,820	104	1,060	3.16	3.64	C.
April	2,980	59	840	2.51	2.80	B.
May	2,680	23	320	.955	1.10	B.
June	1,880	14	357	1.07	1.19	C.
July	1,580	8	323	.964	1.11	C.
August	652	6.5	100	.299	.34	C.
September	59	2.5	13.1	.039	.04	D.
October	......	......	......	......	......	
November	187	7	28.3	.084	.09	D.
December	10	6	8.15	.024	.03	D.

NOTE.—See footnote to table of daily discharge.

BIG MUDDY RIVER NEAR CAMBON, ILL.

Location.—At the Chicago, Burlington & Quincy Railroad bridge about 1 mile north of Cambon station and 1½ miles east of Plumfield, Ill., in sec. 17, T. 7 S., R. 2 E., about one-fourth mile below the mouth of the Middle Fork.

Records available.—June 16, 1908, to September 30, 1912; November 1 to December 31, 1912, when station was finally discontinued.

Drainage area.—735 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Probably permanent except at low stages.

Discharge measurements.—Made from downstream side of bridge and wooden approach trestles.

Floods.—Maximum gage heights since establishment of the gage—25.3 feet—occurred in May, 1911. No available records of floods prior to establishment of station.

Winter flow.—Ice may affect the relation between gage height and discharge during portions of December, January, and February.

The following discharge measurement was made by wading at a section about 100 feet below the bridge by P. S. Monk:

August 10, 1912: Gage height, 2.43 feet; discharge, 14.6 second-feet.

Daily gage height, in feet, of Big Muddy River near Cambon, Ill., for 1912.

[Joel Prine, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.0	6.2	20.3	19.2	21.2	10.7	4.5	6.0	6.0	....	3.8	2.1
2	11.4	5.8	20.5	19.0	20.1	8.4	3.8	5.0	5.0	....	4.2	2.3
3	9.8	5.6	19.2	18.4	18.4	6.2	3.6	4.3	4.3	....	6.1	2.3
4	6.6	4.0	17.3	17.9	16.8	5.8	7.6	4.0	4.0	....	7.6	2.3
5	6.0	3.7	15.5	17.5	12.9	4.1	10.6	3.3	3.3	....	8.0	2.2
6	5.4	3.6	12.7	16.7	10.0	3.7	9.4	3.1	3.1	....	6.9	2.2
7	4.8	3.4	9.8	16.5	6.9	3.4	9.4	2.8	2.8	....	4.7	2.1
8	4.6	3.3	10.6	15.7	4.5	3.1	9.0	2.6	2.4	....	6.4	2.1
9	4.4	3.3	12.6	13.0	3.7	2.9	7.8	2.5	2.5	....	8.8	2.1
10	3.5	3.2	13.7	9.5	3.4	2.7	5.7	2.4	2.4	....	8.3	2.2
11	3.4	3.2	14.7	6.6	5.1	2.5	6.3	3.0	3.0	....	6.8	2.3
12	3.3	3.1	15.1	5.1	10.5	2.4	8.1	4.2	4.2	....	4.9	2.3
13	3.1	3.1	15.6	4.4	11.9	2.3	10.4	5.5	5.0	....	4.1	2.2
14	3.0	3.0	16.1	4.3	12.9	2.3	11.3	7.1	7.1	....	4.1	2.1
15	3.0	3.0	17.6	5.7	13.4	2.3	9.8	7.4	7.4	....	4.1	2.1
16	3.0	3.0	17.8	5.7	12.6	2.3	6.5	6.5	6.0	....	3.5	2.2
17	6.0	3.1	19.0	4.9	10.4	8.6	4.4	4.4	5.3	....	3.2	2.2
18	8.0	3.3	19.2	4.6	9.4	14.0	3.8	3.8	5.0	....	3.0	2.3
19	11.0	3.7	19.0	5.8	7.3	15.2	3.1	3.1	4.8	....	2.9	2.3
20	14.0	4.5	18.4	5.9	5.8	16.5	2.9	2.9	4.7	....	2.8	2.2
21	14.4	6.2	15.9	4.6	4.7	17.8	2.8	2.8	4.6	....	2.7	2.1
22	14.7	6.7	17.5	6.3	4.0	19.0	2.7	2.7	3.8	....	2.6	2.1
23	15.7	6.2	17.4	8.5	3.6	19.2	2.6	2.6	3.6	....	2.5	2.1
24	16.7	6.0	17.4	8.2	3.4	18.7	4.3	4.3	2.9	....	2.4	2.2
25	16.4	9.8	17.5	6.0	3.1	17.2	4.5	3.9	2.7	....	2.3	2.3
26	15.9	14.8	17.6	12.8	2.9	14.9	3.9	3.1	5.0	....	2.3	2.3
27	15.4	17.0	17.6	17.2	2.8	10.3	3.1	3.0	7.4	....	2.3	2.2
28	14.6	19.0	17.5	21.2	3.2	7.5	2.9	2.9	9.2	....	2.2	2.2
29	14.0	19.9	17.6	22.0	4.6	5.7	2.6	2.3	11.3	....	2.2	2.3
30	13.7	....	17.9	22.5	8.7	4.9	2.2	2.2	12.0	....	2.1	2.3
31	13.5	....	....	....	10.4	....	7.2	7.2	....	....	....	2.2

NOTE.—Relation of gage height to discharge affected by ice about Jan. 7 to 31 and Feb. 5 to 18.

Daily discharge, in second-feet, of Big Muddy River near Cambon, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,070	274	5,850	4,900	6,710	1,000	111	250	250	....	69	4
2	1,160	228	6,030	4,740	5,670	574	69	148	148	....	92	9
3	824	206	4,900	4,260	4,260	274	59	98	98	....	262	9
4	324	84	3,490	3,910	3,180	228	454	80	80	....	454	9
5	250	....	2,500	3,630	1,530	86	982	45	45	....	510	6
6	186	....	1,470	3,120	860	64	752	37	37	....	363	6
7	....	....	824	3,000	363	49	752	26	26	....	125	4
8	....	....	982	2,600	111	37	680	20	13	....	298	4
9	....	....	1,440	1,560	64	30	482	16	16	....	644	4
10	....	....	1,780	770	49	23	217	13	13	....	558	6
11	....	....	2,160	324	157	16	286	33	33	....	350	9
12	....	....	2,320	157	960	13	526	92	92	....	140	9
13	....	....	2,550	104	1,270	9	940	196	148	....	86	6
14	....	....	2,800	99	1,530	9	1,140	389	389	....	86	6
15	....	....	3,700	217	1,680	9	824	428	428	....	86	6
16	....	....	3,840	217	1,440	9	311	311	250	....	54	6
17	....	....	4,740	140	940	608	104	104	176	....	41	6
18	....	....	4,900	117	752	1,880	69	69	148	....	33	9
19	....	71	4,740	228	415	2,360	37	37	132	....	30	9
20	....	110	4,260	239	228	3,000	30	30	125	....	26	6
21	....	274	2,700	117	125	3,840	26	26	118	....	23	4
22	....	337	3,630	286	80	4,740	23	23	69	....	20	4
23	....	274	3,560	590	59	4,900	20	20	59	....	16	4
24	....	250	3,560	542	49	4,450	98	98	30	....	13	6
25	....	824	3,630	260	37	3,420	111	74	23	....	9	9
26	....	2,200	3,700	1,500	30	2,240	74	37	148	....	9	9
27	....	3,300	3,700	3,420	26	920	37	33	428	....	9	6
28	....	4,740	3,630	6,710	41	441	30	30	716	....	6	6
29	....	5,490	3,700	7,530	118	217	20	9	1,140	....	6	9
30	....	....	3,910	8,060	626	140	6	6	1,290	....	4	9
31	....	....	4,400	....	940	....	402	402	....	....	....	6

NOTE.—Daily discharge computed from a fairly well defined rating curve. Below 132 second-feet (gage height 4.8 feet) the rating curve differs from that used during 1911, the change being based on the discharge measurement made Aug. 10, 1912. Discharge Jan. 7 to 31 and Feb. 5 to 18 estimated, because of ice, from gage heights, climatologic records, and discharge of adjacent drainage areas, as follows: Jan. 7 to 31, 550 second-feet; Feb. 5 to 18, 20 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Discharge Mar. 31 interpolated.

Monthly discharge of Big Muddy River near Cambon, Ill., for 1912.

[Drainage area, 735 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	567	0.771	0.89	D.
February	5,490	....	653	.888	.96	D.
March	6,030	824	3,400	4.63	5.34	B.
April	8,060	99	2,110	2.87	3.20	B.
May	6,710	26	1,110	1.51	1.74	B.
June	4,900	9	1,190	1.62	1.81	B.
July	1,140	6	312	.424	.49	B.
August	428	6	103	.140	.16	B.
September	1,290	13	222	.302	.34	B.
October	....	....	....	....	....	
November	644	4	147	.200	.22	C.
December	9	4	6.5	.0088	.01	D.

NOTE.—See footnote to table of daily discharge.

BEAUCOUP CREEK NEAR PINCKNEYVILLE, ILL.

Location.—At Illinois Central Railroad bridge about 1½ miles east of Pinckneyville, Ill., about 10 miles above the mouth of Galum Creek.

Records available.—June 17, 1908, to September 30, 1912; November 30 to December 31, 1912, when station was finally discontinued. The gage readings for 1908 were taken whenever the observer happened to be in the vicinity of the gage. Except for a few days, fairly accturae results will probably be obtained if the missing gage heights are interpolated.

Drainage area.—227 square miles.

Gage.—Standard chain gage attached to bridge; datum unchanged.

Channel.—Practically permanent except at low stages.

Discharge measurements.—Made from downstream side of wooden trestle; low-water measurements made at wading section about 250 yards upstream.

Floods.—The flood of 1902 reached a height of about 27.5 feet, referred to the present gage.

Winter flow.—Ice sometimes affects the relation between gage height and discharge during parts of December, January, and February.

Remarks.—The creek goes dry at times, the water then standing in pools near the gage.

The following discharge measurement was made at wading section above bridge by P. S. Monk:

August 8, 1912: Gage height, 2.12 feet; discharge, 2.3 second-feet.

Daily gage height, in feet, of Beaucoup Creek near Pinckneyville, Ill., for 1912.

[R. C. Huggins, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.5	2.84	7.5	5.5	4.5	2.65	2.24	3.25	2.36	......	2.40	1.95
2	4.2	2.66	7.4	12.0	3.8	......	2.22	2.00	2.20	......	6.4	1.98
3	3.6	......	......	15.0	3.35	2.45	4.8	......	2.05	......	3.6	1.96
4	3.1	2.98	5.2	12.0	3.05	2.90	4.4	2.29	2.00	......	2.87	1.98
5	2.90	......	4.1	......	2.86	2.56	2.52	2.20	1.95	......	2.62	2.00
6	2.80	......	3.65	4.5	2.74	2.41	11.0	2.17	1.90	......	3.4	1.97
7	2.70	......	4.0	3.95	2.61	2.27	10.2	2.04	1.90	......	3.4	......
8	2.70	......	4.9	3.5	2.54	2.25	4.9	2.05	1.90	......	4.2	1.90
9	2.38	......	5.1	3.25	2.46	2.21	3.45	2.12	1.90	......	3.2	1.89
10	2.34	......	7.6	2.97	2.45	2.14	2.74	......	1.85	......	3.0	......
11	[a] 2.34	......	......	2.96	3.35	2.13	3.95	2.13	1.62	......	2.45	1.90
12	[a] 2.34	......	7.8	2.84	14.8	2.12	3.25	3.0	1.60	......	2.40	1.90
13	......	......	8.9	4.3	11.3	2.07	3.35	4.9	......	......	2.31	1.89
14	2.29	2.43	11.8	5.4	4.8	2.05	3.05	2.25	......	......	2.28	1.87
15	......	......	16.3	3.75	3.75	2.15	2.36	3.1	......	......	3.3	1.87
16	......	......	17.3	3.35	2.41	3.1	2.32	3.1	1.80	......	2.70	1.84
17	......	2.43	17.8	2.97	3.7	9.2	2.24	2.10	1.84	......	2.34	......
18	......	2.58	17.1	3.35	3.75	13.3	2.15	2.14	1.82	......	2.28	......
19	13.2	2.88	15.4	3.85	......	8.2	3.35	2.30	......	......	2.30	1.89
20	15.0	3.2	11.0	3.3	2.77	5.1	2.74	2.20	......	......	2.28	1.90
21	12.5	......	9.8	2.96	2.58	4.5	......	4.3	1.98	......	2.20	1.90
22	7.2	3.5	13.0	2.94	2.51	3.5	11.0	3.2	1.95	......	2.15	......
23	7.6	3.65	7.7	2.78	2.37	2.45	5.1	2.89	2.00	......	2.18	......
24	9.5	......	9.0	2.71	2.36	2.56	3.55	2.59	2.00	......	2.16	1.90
25	9.1	5.5	11.0	2.61	5.4	2.55	2.23	......	2.01	......	2.15	1.90
26	7.0	16.1	12.0	13.8	......	2.38	2.44	2.60	......	......	2.10	......
27	5.6	20.1	7.8	19.0	2.27	2.27	2.24	5.2	......	......	2.05	1.89
28	5.4	19.8	6.8	18.2	4.6	......	2.22	3.6	1.90	......	1.98	1.90
29	5.3	17.4	15.0	10.2	7.4	2.64	8.2	2.65	1.98	......	1.95	1.95
30	4.8	......	17.5	6.3	5.3	2.32	3.05	2.60	2.00	......	1.90	......
31	3.85	......	......	......	3.2	......	3.0	2.56	......	......	......	1.90

[a] Gage height to top of ice.

NOTE.—Relation of gage height to discharge affected by ice about Jan. 5 to 18 and Feb. 3 to 16. Observer reported ice about 4 inches thick from Jan. 14 to Feb. 14.

Daily discharge, in second-feet, of Beaucoup Creek near Pinckneyville, Ill., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	272	25	363	187	112	17	4.8	42	7.2	....	8	1.8
2	92	17	353	900	70	*a* 13	4.4	2.1	4.0	....	263	2.0
3	60	....	*a* 258	1,320	48	9.5	133	*a* 4.0	2.4	....	60	1.9
4	35	....	163	900	33	27	105	5.8	2.1	....	24	2.0
5	....	....	86	*a* 506	25	13	12	4.0	1.8	....	16	2.1
6	....	....	62	112	21	8.3	770	3.6	1.5	....	50	1.9
7	....	....	80	78	15	5.4	666	2.4	1.5	....	50	*a* 1.7
8	....	....	140	55	13	5.0	140	2.4	1.5	....	92	1.5
9	....	....	155	42	10	4.2	52	3.0	1.5	....	40	1.4
10	....	....	373	30	9.5	3.3	21	*a* 3.1	1.2	....	31	*a* 1.4
11	....	....	*a* 383	29	48	3.2	78	3.2	.6	....	9.5	1.5
12	....	....	393	25	1,290	3.0	42	31	.6	....	8	1.5
13	....	....	512	98	809	2.6	48	140	*a*.7	....	6.2	1.4
14	....	....	874	179	133	2.4	33	5	*a*.8	....	5.6	1.4
15	....	....	1,500	68	68	3.4	7.2	35	*a*.9	....	45	1.4
16	....	....	1,640	48	8.3	35	6.4	35	1.0	....	19	1.2
17	....	9	1,710	30	65	545	4.8	2.8	1.2	....	6.8	*a* 1.3
18	....	14	1,610	48	68	1,080	3.4	3.8	1.1	....	5.6	*a* 1.3
19	1,070	26	1,380	72	*a* 45	435	48	6	*a* 1.4	....	6	1.4
20	1,320	40	770	45	22	155	21	4	*a* 1.7	....	5.6	1.5
21	970	*a* 48	616	29	14	112	*a* 396	98	2.0	....	4	1.5
22	335	55	1,040	29	11	55	770	40	1.8	....	3.4	*a* 1.5
23	373	62	383	22	7.4	9.5	155	27	2.1	....	3.8	*a* 1.5
24	580	*a* 124	523	19	7.2	13	58	15	2.1	....	3.5	1.5
25	534	187	770	15	179	13	4.6	*a* 15	2.2	....	3.4	1.5
26	317	1,470	900	1,150	*a* 92	7.6	9.2	15	*a* 2.0	....	2.8	*a* 1.4
27	195	2,030	393	1,880	5.4	5.4	4.8	163	*a* 1.8	....	2.4	1.4
28	179	1,990	299	1,770	119	*a* 11	4.4	60	1.5	....	2.0	1.5
29	171	1,660	1,320	666	353	17	435	17	2.0	....	1.8	1.8
30	133	....	1,670	254	171	6.4	33	15	2.1	....	1.5	*a* 1.6
31	72	....	*a* 928	....	40	....	31	13	....	....	....	1.5

a Discharge interpolated.

NOTE.—Daily discharge computed from a rating curve fairly well defined between 2 and 900 second-feet (gage heights, 2.0 and 12.0 feet). Below 40 second-feet (gage height 3.2 feet) differs from that used 1908–1911, the revision being based on the discharge measurement made Aug. 8, 1912. Discharge Jan. 5 to 18 and Feb. 3 to 16 estimated, because of ice, from gage heights, observer's notes, climatologic records, and discharge of adjacent drainage areas: Jan. 5 to 18, 5 second-feet; Feb. 3 to 16, 8 second-feet. These estimates of discharge for periods when the relation of gage height to discharge is believed to have been affected by ice are based on insufficient data and therefore should be used with caution.

Monthly discharge of Beaucoup Creek near Pinckneyville, Ill., for 1912.

[Drainage area, 227 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	....	....	219	0.965	1.11	D.
February	2,030	....	271	1.19	1.28	D.
March	1,710	62	698	3.07	3.54	C.
April	1,880	15	354	1.56	1.74	B.
May	1,290	5.4	126	.555	.64	B.
June	1,080	2.4	87.3	.385	.43	C.
July	770	3.4	132	.581	.67	B.
August	163	2.1	26.3	.116	.13	B.
September	7.2	.6	1.81	.0080	.01	D.
October	....	....	....	....	....	
November	263	1.5	26.0	.115	.13	C.
December	2.1	1.2	1.56	.0069	.01	D.

NOTE.—See footnote to table of daily discharge.

MISCELLANEOUS MEASUREMENTS.

Miscellaneous measurements in Hudson Bay and upper Mississippi drainage basins in 1912.

St. Mary River (Mont.) drainage basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 19	Swiftcurrent Creek	St. Mary River....	McDermott Lake, Mont.............	....	10.8
June 7	Kennedy Creek....	.....do..........	Babb, Mont....................	....	179
Aug. 16	.....do..........	.....do..........	.....do....................	....	55

Red River (Minn.) drainage basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
May 6[a]	Bois de Sioux River.	Red River........	Breckenridge, Minn., about 300 feet above junction with Ottertail River.	....	48
6[a]	Ottertail River....	.....do..........	Breckenridge, Minn., about 300 feet above junction with Bois de Sioux River.	....	590

Upper Mississippi River drainage basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
Feb. 12	Mississippi River..	Gulf of Mexico....	Washington Avenue Bridge, Minneapolis, Minn.	....	2,380
Sept. 4	.....do..........	.....do..........	Winona, Minn..................	5.48	27,800
July 18	Blue Earth River..	Minnesota River..	Rapidan Mills, Minn..............	1.50	262

[a] Measurement made by S. B. Soulé.

SUMMARY OF MEAN DISCHARGE PER SQUARE MILE.

The following summary of discharge per square mile is given to allow ready comparison of relative rates of run-off from different areas in the Hudson Bay and upper Mississippi drainage basins. It shows in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and storage—both artificial and natural. It will be noted that "second-feet per square mile" and "run-off (depth in inches)" have been omitted in this report for certain stations for which such values have heretofore been published, in general, because they were deemed misleading in that they did not represent the rate of run-off for the entire drainage area above the gaging station or that the drainage area was not uniformly productive of run-off and therefore not at all comparable with other areas. The special reasons for not publishing these data are given in each case with the data published for the station.

With regard to the values that are published, the most noteworthy fact is the almost entire lack of uniformity or agreement between any two streams, which indicates that the discharge of each stream is a law unto itself and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, in Hudson Bay and upper Mississippi River drainage basins for 1912.

Station.	Drainage area.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
	Sq. mi.													
St. Mary River near Babb, Mont.	177	0.37	0.34	0.28	0.89	5.53	7.68	5.20	3.16	1.81	1.14	1.23	0.71	2.37
St. Mary River below Swiftcurrent Creek, at Babb, Mont.	298	.33	.34	.26	1.26	5.34	6.68	4.90	2.60	1.55	1.14	1.18	.66	2.19
St. Mary River near Cardston, Alberta	452	.29	.26	.24	1.20	4.49	5.20	3.50	1.96	1.16	.94	.96	.55	1.78
Swiftcurrent Creek at McDermott Lake, Mont.	31.4	......	......	......	......	......	......	7.32	4.01	2.79	2.20	......	......	......
Swiftcurrent Creek at Sherburne Lake, Mont.	64	......	......	......	......	......	......	5.84	2.74	1.88	1.46	1.44	.97	......
Ottertail River near Fergus Falls, Minn.	1,310	.06	.06	.05	.14	.22	.26	.21	.16	.16	.15	.15	.12	.14
Vermilion River below Lake Vermilion, near Tower, Minn.	507	.25	.23	.19	.23	.97	.90	.41	.21	.22	.22	.20	.20	.35
Little Fork River at Little Fork, Minn.	1,720	.05	.04	.04	.66	1.32	.34	.18	.08	.43	.31	.18	.09	.31
Crow Wing River at Nimrod, Minn.	1,010	......	......	......	......	.46	.33	.24	.32	.40	.40	.32	......	......
Crow Wing River at Pillager, Minn.	3,230	.11	.10	.12	.42	.82	.32	.20	.23	.23	.22	.17	.14	.26
Long Prairie River near Motley, Minn.	975	.11	.10	.12	.31	.87	.35	.18	.27	.22	.17	.13	.10	.24
Sauk River near St. Cloud, Minn.	816	.07	.04	.10	.33	1.32	.28	.11	.23	.19	.20	.11	.10	.26
Elk River near Big Lake, Minn.	615	.10	.08	.15	.92	2.15	.47	.24	.27	.33	.24	.19	.15	.44
Crow River at Rockford, Minn.	2,520	.02	.03	.15	.37	.82	.25	.16	.36	.24	.11	.07	.06	.22
South Fork Crow River near Rockford, Minn.	1,160	.02	.01	.10	......	......	......	......	......	......	......	......	......	......
Minnesota River near Odessa, Minn.	1,560	(a)	(a)	.01	.09	.06	.02	.04	.03	.02	.02	.02	.02	.03
Minnesota River near Montevideo, Minn.	6,300	(a)	(a)	.01	.10	.29	.07	.04	.02	.02	.02	.02	.02	.05
Minnesota River near Mankato, Minn.	14,600	.02	.02	.10	.29	.29	.10	.06	.04	.03	.02	.02	.02	.08
Whetstone River near Big Stone, S. Dak.	441	......	......	......	.23	.16	.04	.05	.01	.01	.01	.01	......	......
Lac qui Parle River at Lac qui Parle, Minn.	838	(a)	(a)	.01	.10	.45	.09	.02	.02	.01	.01	.01	.01	.06
Chippewa River near Watson, Minn.	1,940	(a)	(a)	.01	.15	.45	.08	.03	.03	.02	.03	.03	.02	.07
Redwood River near Redwood Falls, Minn.	703	(a)	(a)	.01	.08	.14	.03	.02	.01	.01	.03	.03	.01	.03
Cottonwood River near New Ulm, Minn.	864	.02	.02	.10	.27	.14	.06	.04	.03	.02	.02	.02	.02	.06
St. Croix River near St. Croix Falls, Wis.	5,930	.25	.24	.26	1.16	1.65	.60	.30	.29	.35	.31	.26	.25	.49
Kettle River near Sandstone, Minn.	825	.16	.11	.12	1.81	3.08	.74	.21	.18	.19	.14	.10	.10	.58
Snake River at Mora, Minn.	422	.07	.08	.10	1.79	2.82	.47	.12	.12	.13	.09	.08	.08	.50
Zumbro River at Zumbro Falls, Minn.	1,390	.18	.17	.71	.86	.61	.21	.22	.17	.14	.14	.15	.13	.31
South Branch of Zumbro River near Zumbro Falls, Minn.	821	.20	.18	1.07	1.13	.89	.28	.26	.18	.19	.15	.15	.13	.40
Root River near Houston, Minn.	1,560	.31	.26	.80	1.00	.67	.36	.53	.29	.26	.27	.26	.21	.44
North Branch of Root River near Lanesboro, Minn.	647	.28	.23	1.27	1.38	.93	.36	.45	.26	.25	.25	.25	.20	.51
Wapsipinicon River at Stone City, Iowa	1,310	.15	.12	.76	2.20	.36	.18	.12	.39	.25	.26	.20	.14	.42
Cedar River near Austin, Minn.	425	.16	.11	1.20	1.46	.37	.17	.67	.15	.10	.12	.13	.06	.39
Cedar River at Cedar Rapids, Iowa	6,320	.37	.41	1.34	2.03	.52	.26	.23	.24	.21	.20	.16	.13	.51
Des Moines River at Jackson, Minn.	1,160	......	......	......	.25	.12	.03	.01	.02	.01	.01	.01	......	......
Des Moines River at Keosauqua, Iowa	14,300	......	......	......	1.30	.44	.24	.12	.08	.12	.18	.10	......	......
Sangamon River near Monticello, Ill.	550	.56	.84	3.89	2.35	1.93	.26	.58	.14	.04	......	.32	.10	......
Sangamon River at Riverton, Ill.	2,560	.88	.68	2.98	2.60	2.21	.48	.29	.16	.07	.07	.14	.08	.89
South Fork of Sangamon River near Taylorville, Ill.	427	.47	.79	2.76	1.95	1.50	.28	.24	.18	.04	......	.12	.08	......
Salt Creek near Kenney, Ill.	459	.51	.79	2.92	2.37	1.79	.22	.42	.08	.03	......	.48	.13	......
Cahokia Creek near Poag, Ill.	259	.19	1.18	3.51	......	......	......	......	......	......	......	......	......	......

[a] Discharge per square mile less than 0.005 second-feet.

Summary of discharge, in second-feet per square mile, in Hudson Bay and upper Mississippi River drainage basins for 1912—Continued.

Station.	Drainage area.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
	Sq. mi.													
Kaskaskia River near Arcola, Ill	390	0.50	0.56	1.90	2.20	2.07	0.68	0.32	0.17	0.03	....	0.01	(a)	....
Kaskaskia River at Shelbyville, Ill	1,030	.83	1.21	3.98	2.87	1.80	.43	.37	.32	.10	....	.09	0.06	....
Kaskaskia River at Vandalia, Ill	1,980	.52	.72	2.54	2.12	1.30	.47	.54	.24	.14	....	.05	.04	....
Kaskaskia River at Carlyle, Ill	2,680	.59	.60	2.89	2.37	1.64	.44	.61	.36	.11	....	.05	.02	....
Kaskaskia River at New Athens, Ill	5,220	.56	.53	3.70	3.74	2.16	.82	.69	.31	.08	....	.07	.04	....
Shoal Creek near Breese, Ill	760	.43	.69	3.53	2.95	1.29	.32	.36	.09	.05	....	.08	.05	....
Silver Creek near Lebanon, Ill	335	.38	1.03	3.16	2.51	.96	1.07	.96	.30	.04	....	.08	.02	....
Big Muddy River near Cambon, Ill	735	.77	.89	4.63	2.87	1.51	1.62	.42	.14	.30	....	.20	.01	....
Beaucoup Creek near Pinckneyville, Ill	227	.96	1.19	3.07	1.56	.56	.38	.58	.12	.01	....	.12	.01	....

[a] Discharge per square mile less than 0.005 second-feet.

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